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A GOOD deal of discussion is just now going on in the Boston papers about the new building for the Public Library of that city. Some time ago, an appropriation having been made by the City Government for the construction of the building, a competition was announced for plans, which were required to conform to a scheme drawn up with much pains, and with no small amount of understanding of the subject, by the Trustees of the Library. The terms of the competition, particularly as to the ownership of the competing drawings, did not accord with the ideas now accepted in the profession, and the Boston architects generally took no part in the affair. A certain number of drawings were, however, sent in. Most of these followed the directions of the Trustees' circular as to planning and arrangement, but there were one or two, the authors of which had ventured to disregard these directions in points where their trained judgment showed that the Trustees' proposed arrangement could be improved upon. There was certainly nothing surprising in the fact that a skilful professional man, by studying over a problem, should be able to discover a solution which should be in some respects better than the tentative scheme laid down by the Trustees, and the latter, who do not seem to have placed too high a value on their own capacity, were disposed to award their premiums to the plans which they perceived to be better than their own, but were stopped by the City Solicitor, who warned them that their circular of instructions, instead of being simply a collection of suggestions, as they seem to have intended it to be, formed, by its wording, a definite series of stipulations as to the character of the designs required, which not only excluded from consideration all drawings in which these stipulations were violated, but obliged the Trustees to award their premiums, which were very liberal, to plans which were now acknowledged to be less suitable for the building than those which they were debarred from considering. Architects, who frequently experience the necessity for a strict compliance with published terms of competition, will easily perceive that this reasoning was conclusive; and the Trustees yielded honorably to what could hardly have been otherwise than a rather mortifying disappointment, and distributed their prizes among the authors of the best of the designs in which their directions were followed.

AS none of these designs, or any others at the disposal of the city, were quite suitable for execution, the Trustees finally applied to the City Architect to prepare plans under their direction, and, in accordance with floor plans so made, the foundations of the building have been put in. So far, however, nothing has been made public as to the character of the design for the exterior, and some of the citizens, very properly feeling that a costly public building, on what is perhaps the most conspicuous site in the town, next to that on which the State-House stands, ought to be a first-rate example of that architectural art which the profession in Boston can justly claim to have, done so much to develop, have, both in public and in private expressed the wish that some assurance should be given that the design of the structure should be the best that the city can furnish. In this they do not for a moment call in question the talents of the City Architect, but believe that if it is possible to secure a more artistic treatment of the subject than he could give it, the city should endeavor to do so, and for this purpose they propose either that some architect of more conspicuous artistic reputation than the City Architect should be at once employed to complete the building, or that the method in use in all other civilized communities, of inviting competitive designs on such terms that architects of ability and character will be willing to compete, should be adopted. By this means, if any design can be produced better than that which the City Architect intends to make, the city will have the benefit of it; and if nobody else can make one as good, there will at least be an advantage in proving this, instead of leaving the citizens with the idea that the trustees of their library pay no attention to their perfectly legitimate wish to get the best building that they can for their money.

WE must say that we sympathize somewhat with the citizens in this matter. If there were any great saving of expense in having the building planned and executed under the care of the City Architect, there would be perhaps a reason for managing the affair in the way in which it has been carried on; but, independent of the fact that the very best professional advice, at least with regard to building operations, is always the cheapest in the end, it is tolerably certain, judging from the figures which have been published about the expenses of the City Architect's office, that the work which he does, or is likely to do, on the plans for the library, will cost the city quite as much as would be charged for the same service by a private architect, to say nothing of the fact that the City Architect is by his position simply an irresponsible official, having nothing at stake in the correctness or adequacy of his plans, the consequence of any defects in which must be assumed by the city whose salaried employé he is; while the multitude of duties which crowd upon him must necessarily prevent him from giving to the work of executing them that close personal supervision which a private architect is held, by his knowledge of his accountability for negligence, as well as his habits of practice, to bestow upon his buildings. We feel that we cast no reflection upon the present City Architect, whose efficiency and industry we know well, in saying that the observations which we were able to make during a short visit to the site of the library building not long ago suggested to us that there was serious need of such supervision of the operations being carried on there as only an architect, familiar with the whole structure of the intended building, can give; and, as it is plainly impossible for the busy City Architect to afford the time necessary for such supervision, and injudicious, to say the least, to delegate it to subordinates, it is hard to avoid the inference that it would be found in Boston, as it already has in other civilized places, most prudent in the end to commit such work to private and responsible professional men, who can give to it the attention that it requires.

THE great competition for designs for a new front for the Cathedral of Milan is soon to be decided, and the jury has already been appointed. The first member of the jury is Don Antonio Ceruti, of the Ambrosian Library at Milan; and the second is Signor Carlo Ermes Visconti, of Milan, who is nominated by the governors of the Cathedral, and will act as the president of the jury; and then come Professor Boito of Milan, an architect, and Professor Bartini, a painter, both nominated by the City Council of Milan. Four more architects, Sig. Giacomo Franco of Venice, Baron von Schmidt of Vienna, Mr. Alfred Waterhouse of London, and M. Ferdinand de Darteine Marie, as the *Deutsche Bauzeitung* calls him, of Paris, are named by the Royal Academy of Fine Arts in Milan; and three more members, Professor Clericetti, Signor Cantu, and Signor Brioschi, all of Milan, are chosen by various scientific and artistic bodies in the city. For the information of the jury, the Cathedral Commission has placed at its disposal a great collection of drawings, photographs and

designs of all sorts relating to the building, and it seems in every way likely that the competition will be a successful one. We know much less about the Italian members of the jury than the others, but if the selection of them has been made with the admirable judgment which suggested the appointment of Mr. Waterhouse and Baron Schmidt, their verdict will command the respect of the whole artistic world.

ACCORDING to *Le Génie Civil*, the United States have reason to be proud of rivalling, in one important industry, any other nation in the world. No doubt the enormous extent of our country, with our activity in railroad building, have contributed to develop the manufacture of locomotive engines, but something more is probably due to the natural ingenuity of Americans, and their fondness for mechanical pursuits of a higher class, and at present the Baldwin Locomotive Works of Philadelphia far surpass any others in the world in the extent of their business, making every year six hundred engines. The largest establishment of the kind in Europe is the Borsig factory at Berlin, which turns out three hundred engines a year, and sends them to all parts of the Continent. England, which manufactures for her colonies as well as herself, produces twenty-two hundred locomotives, and Germany about two thousand, while France makes one thousand, and Russia, with its great territory, only forty. It is rather surprising to find that Austria, which is usually regarded as a torpid agricultural country, makes nearly as many locomotives in a year as Belgium, the most industrious and thickly-settled country in Europe as well as the centre of the great transportation lines between Great Britain and the Continent.

THE *Scientific American* calls attention to the fact that M. Sainte-Claire Deville, the great French chemist and metallurgist, has recently discovered that certain compounds of hydrate of lime and hydrate of magnesia form a strongly hydraulic cement, and that dolomite, which is a natural compound of the carbonates of lime and magnesia, furnishes, by burning at a very low red heat, and grinding, a quick-setting hydraulic cement, which becomes so hard that it may be employed as an artificial stone. As dolomite is a very common mineral, this discovery has considerable importance, and it seems not at all impossible that districts which are now obliged to import hydraulic cements at a high price might, by a little persevering study of the process, be abundantly supplied with a tolerably good substitute for them. In many parts of our Eastern and Middle States, for instance, dolomite exists in enormous quantities, and although in some cases a far superior cement stone lies close by, there are other places where none of this has been found.

WITHIN the past few years several towns in the Western States have been experimenting with street pavements of brick. Many miles of brick pavement, it is needless to say, exist in Holland, and, if we are not mistaken, there are remains of brick in the streets of Nantucket, but elsewhere in the United States this material has been rarely, if ever before, used for the purpose. According to the *Engineering News*, Bloomington deserves the credit of being the first modern town in this country to introduce brick paving on an extensive scale. The town is situated in a clay region, and bricks are cheap there, as well as good, and by careful selection of material it has been found possible to produce bricks so tough and hard that in Bloomington, where seven miles of streets are now laid with them, they have been found, after ten years' experience, durable, as well as cheap and convenient. In Amsterdam, where, although canals intersect the city in all directions, a good deal of traffic is carried on by means of horses and wagons, the pavements of small, whitish bricks show little sign of wear, and, partly on account of their porosity, and partly from the numerous joints which exist between them, they are in wet weather much dryer and pleasanter to walk over than stone, or even asphalt. In the Illinois towns, the street is prepared for paving by forming the natural surface into the proper profile; on this is then laid four inches of coarse sand or cinders, evenly spread, cinders being preferred, on account of the better drainage which they afford, and the whole is covered with bricks laid flat, with joints as close as possible, and accurately formed to the desired profile. Fine sand is then spread over the surface, and worked well into the joints with a broom, and, after laying an inch more of sand over it, the top course, consisting of bricks on edge, is set, as closely as possible, and the joints of this also well filled with sand. The multiplicity of joints makes the pavement easy and safe for horses to travel over, and the whole cost is only from one dollar and forty cents to one dollar and eighty cents per square yard.

THE subject of the preservation of wood by impregnating it with tar, has been called to mind again by a discussion in the Association of Civil Engineers in London, and M. Le Blanc, in commenting upon the discussion in the *Revue Industrielle*, calls to mind the fact that long ago M. Melsens, a member of the Academy of Sciences of Belgium, described some experiments, which, following the indications derived from the study of the bituminous and resinous preservation used in embalming by the Egyptians, he had made upon pieces of wood saturated with tar. In 1841, several sticks, about sixteen inches long and ten in diameter, were impregnated with gas-tar by heating them repeatedly, plunging them in melted tar, and allowing them to cool. After this preparation, the sticks were buried in a damp corner of a garden, and left there for two years. At the end of that time they were split, and found to show white streaks, where the tar had not penetrated the wood. The pieces were then buried again for several years; then taken up and kept eighteen months in a dry place; then placed in a bath of live steam for twelve hours, cooled by plunging in water, and afterwards frozen; then left on the grass for a long time, and afterwards exposed on the flat roof of a house; then buried again in sandy soil mixed with mortar for six years; and finally placed on supports under a rain-water hogshead. After twenty years of this sort of treatment, the wood was found in perfect condition, showing no sign whatever of alteration. The inference which M. Melsens drew from this was, that an injection of tar, however made, preserves the wood which it touches, and he proposed that instead of simply charring posts to be set in the ground, they should be dipped in very hot tar, which would vaporize the water in the pores, and enter afterwards the vacuum formed by the dissipation or condensation of this vapor.

ACCORDING to the Vienna *Bauindustrie-Zeitung*, the Russian Government is fully resolved upon the construction of a railway from Russia to China, and has recently summoned to St. Petersburg the Governors of Eastern Siberia and the Amoor Province, to consult upon the details of the undertaking. The only doubt seems now to be as to the starting-point at the Russian end, but it is understood the Government favors making the terminus at Ekaterinoslav, near Odessa, from which there is already a railway to Orenburg, on the border of Asia. From Orenburg the line would run nearly east to Tomsk, the most important town in the most populous province of Siberia, and then by the great caravan route, one of the oldest and most frequented in the world, to Irkoutsk and Kiachta, on the Chinese frontier. From Kiachta the road is to run southerly to Ourga, at the edge of the Chinese desert, and from there to Pekin nearly in a straight line; and from Pekin it is intended ultimately to extend the road to Shanghai. Altogether, the railway will be nearly six thousand miles in length, but about twelve hundred miles is already constructed. So far as the topography of the country is concerned, there will be no serious difficulties to be overcome until the Chinese frontier is reached, but the climate is likely to make both the construction and maintenance of the line somewhat costly, the thermometer, over a larger portion of Siberia, often falling to sixty below zero of Fahrenheit's thermometer, while in many provinces mercury in the open air usually remains frozen for two months out of every year. The Russians, however, are not much afraid of the cold, and the enterprise and determination which have founded such cities as Irkoutsk, with its population of nearly two hundred thousand souls, in the middle of these frozen plains, will not be likely to quail before the difficulties of an enterprise which promises so much for the future prosperity of the Empire. Whatever may be said of the ambition of Russia, her restless, active spirit is of no small value in the world, and if she should really succeed in establishing, as seems not unlikely, not only the railway from St. Petersburg to India, which is already within a few hundred miles of accomplishment, but a line to China, she may justly claim to be the leader of the world in material progress.

PARIS CHURCHES. — III.

ST. GERMAIN DES PRES.

FROM REVOIL.

THE Abbey of St. Germain, of which nothing remains but the church and the abbot's palace, was, after Notre Dame, the oldest foundation in Paris. It dates back to the earliest period of French monarchy, and its history is mixed up with that of some of France's best and noblest sons. The St. Germain, to whom the church was dedicated, was an early bishop of Paris, and must not be confounded with St. Germain or Germanus, bishop of Auxerre, who discovered the holiness of Ste. Geneviève when passing through Paris *en route* for Britain, where he had been invited to a synod with Lupus, bishop of Troies, to refute the Pelagian heresy, which had, Camden says, "in the year of the World's Redemption 429, budded forth afresh into this island." The monastery was founded by Childebert I, at the instigation of the Saint in this wise: It appears that the king, returning from a second expedition against the Visigoths in Spain (531–543), had brought with him much loot of various kinds — St. Vincent's tunic, a rich gold cross ornamented with precious stones from Toledo, some vases said to have belonged to King Solomon, and a quantity of chalices, patens and golden covers for the Gospels: what could be more natural in the sixth century than to build a church to contain these treasures, and to found a monastery whose inmates should protect them? Accordingly, Childebert agreed to carry out the suggestion of the bishop, and the first stone of the abbey was laid amid the green fields which have now developed into the densely-populated Faubourg St. Germain. The enclosure extended from the Rue Jacob, on the north, to the Rue Ste. Marguerite, on the south, while the eastern and western bounderies were the present Rue Lachaudé and the Rue Bonaparte. The buildings within the precincts were very numerous; indeed, they formed a city in themselves, and were originally surrounded by walls and a moat, which was filled by the waters of the Seine. There were three gates: the Petit-Bourbon, Ste. Marguerite, and St. Benoit. The latter still remains, ornamented by an architrave supported by Ionic columns. The church was originally dedicated by St. Germain to the Holy Cross and St. Vincent, the ceremony taking place upon the very day of the death of Childebert, in 558. It was a cruciform edifice supported by enormous marble columns, pierced with numberless windows, and covered with gold. Paintings on gold grounds embellished the walls. The pavement was mosaic, and the roofs were covered with plaques of gilt copper.

St. Germain dying in 576, his body was buried in the chapel of St. Symphorien, at the end of the church; and it so happened that wondrous miracles and cures were effected at the tomb of the good bishop; so famous, in fact, did it become, that in course of time the abbey was known as that of St. Germain, its original patrons drifting into almost complete oblivion.

Bronze Statue of Daibutsu, Uyena, Japan.

The church served as the burial-place of the Merovingian Kings until the foundation of St. Denis by Dagobert. Thus, during the sixth and seventh centuries the following princes were interred here; the kings Childebert I, Chérebert, Chilpéric I, Clotaire II, and Childéric II; the queens Ultrogothe, Frédégonde, Bertrude, and Bilihilde; the sons of the kings Mérovée, Clovis, and Dagobert, and the princesses Chrodesinde and Chrotberge, daughters of Childebert I. In his "*History of the Abbey*" Dom Bouillart gives an account of the openings of some of these tombs. The bodies, it appears, were enclosed in stone coffins without exterior ornament, and nearly all of them were enveloped in shrouds of silk and other precious stuffs — some of them reposed on beds of odorous herbs, others were surrounded by viols of aromatic scents. Relics of all kinds were found in the coffins, stuffs embroidered in gold, fragments of cross-belts, and foot gear.

The monks whom St. Germain established in the monastery came from St. Symphorien at Autun, and followed the rules of St. Anthony and St. Basil; but shortly after the foundation they adopted the rule of St. Benedict, the great legislator of the monks of the West. In the seventeenth century a second reform took place, that of St. Maur, and it was after this return to primitive discipline that the monks of the abbey became famous throughout Europe by the works of Jean Mabillon, Bernard de Montfaucon, Bouquet, Calmet, and Félibien. Formerly the abbots exercised spiritual and temporal jurisdiction over the whole of what is now the Faubourg St. Germain; but in later times their power was restricted to the immediate precincts of the abbey. Jealousies occurred here, as elsewhere, between the ecclesiastical and other lay element, between the mitred abbots and the bishops. Amongst the former were many cardinals, one of the kings of France, Hugues Capet, Jean Casimir, King of Poland, and several princes of the house of Bourbon.

During the incursions of the Normans upon Paris, the monastery was devastated, burnt, and pillaged at least four or five times: indeed, its situation outside the walls exposed it so much to the fury of the invaders that it required a century's patient labors to repair its disasters. Morard, the twenty-ninth abbot (990–1014) undertook the entire restoration of the church, and it is to him that we owe the oldest extant portions of the nave.

Situated as it was amidst what was termed the *près aux clercs*, or recreation ground for the students of the university, it was necessary that the monastic building should be surrounded by fortified walls and a moat, and protected from danger of assault by watch-towers and strong gates. Later, when danger from attack had passed away, streets took the place of the moat, and houses occupied the site of the fortifications. At the commencement of the last century the monks built several large houses from plans by Victor d' Ailly, which were occupied by the artisans who paid a heavy rent for the privileges they enjoyed of living within the precincts of the abbey. These habitations formed the Rues Childebert, Ste. Marthe, Cardinale, Abbatiale and de Furstemberg.

There were originally two cloisters situated to the north of the church, but, with the exception of a portion of the larger one which is attached to the building, and which now forms divers apartments, they have been completely destroyed. The round arches and Doric pilasters belong to the seventeenth century; but the older portions, built by Abbot Eudes, were cut through and improved away by the formation of the Rue de l'Abbaye. The same street and its houses have also to answer for the destruction of the refectory, the chapel of the Virgin, the chapter-house and the great sacristy. The smaller cloister formed an entry into the chapel of the Virgin. The refectory, constructed during the life of Abbot Simon, was the work of the celebrated architect of the Sainte Chapelle, Pierre de Montereau, or Montereuil. It was a large building filled with stained glass bearing the arms of France and Castille, a little of which still remains in the church, and at St. Denis. The statue of Childebert, of stone, painted, which formerly stood at the entrance, is now in the Louvre (Renaissance museum, No. 70, in passage leading to the Salle de Michel-Colombe). Dom Jacques Bouillart, describing this refectory as built between 1239–44 remarks: "At the door they have placed a stone statue representing Childebert, apparently modelled upon a more ancient one." Pierre de Montereau was also the architect of the chapel of the Blessed Virgin, commenced under Abbot Hugues d' Issy, who died in 1247, and finished under Thomas de Mauléon, who resigned his dignities in 1255. This chapel had but one rival at Paris, the *chef d' œuvre* of its architecture, the Sainte Chapelle. Pierre died in 1266 and was buried in the chapel of his own creation; the then Abbot Gérard de Moret erecting handsome tombs to his memory and that of his wife, Agnès. The architect held a rule and compass in his hands, and had for epitaph *Flos plenus morum* and *Doctor latomorum*.

Passing along the Rue Bonaparte is the corner of a building which served as kitchen and guests' dormitory; and following the Rue de l'Abbaye to the left is one of the gables of the refectory, some pointed arches and little columns which probably formed part of the parlor and smaller cloisters. On the opposite side is the abbot's palace, a handsome red brick and stone edifice erected by the Cardinal de Bourbon, about 1586. At the summit of a pavilion is a figure of a woman bearing the arms of the founder on an escutcheon. Fragments of the chapel of the Virgin, columns, capitals, gargoyles, balustrades,

etc., were found in a garden hard by, and a figure of the Blessed Virgin was transported to St. Denis.

The gaol was rebuilt in the seventeenth century, and was flanked by four turrets. It was the scene of many horrors from time to time, the abbots possessing the power of punishing as well as of trying criminals; and in 1792 it was filled with priests and nobles who suffered for the crimes of their forefathers as well as for their own; amongst others Mlle. de Sombreuil. It afterwards became a military prison, and finally disappeared in 1854. The library was justly celebrated for its manuscripts, printed books and other objects of value; but was destroyed by fire at the commencement of the Revolution.

The only part of the church which contains any remains of Childebert's structure is the apse; into the triforium of which are built some early white marble capitals and some various-colored marble shafts; but inasmuch as they have been painted over, all interest in them is destroyed.

The earliest part of the present church dates from the beginning of the eleventh century, the choir and apse from the second half of the twelfth century. The best view of the apse with its flying-buttresses is to be obtained from the garden of the abbot's palace, but since the clearing away of the houses which formerly were almost built on to the church, and the planting of gardens round it, the view is picturesque from any point. An insignificant seventeenth-century porch leads to the west door, which is of the same date as the choir, and is surmounted by a much mutilated bas-relief of the Last Supper in the tympanum. The tower has been so much restored and renovated from time to time that little of the original remains. It has a high but stumpy spire covered with slates. Dom Bouillart relates that on the 2d November, 1589, Henri IV mounted to the top of the tower, accompanied by only one ecclesiastic, to examine the situation of Paris. "He afterwards walked round the cloisters, and without speaking one word, departed." Of the other two towers which were formerly at the angles of the choir and transepts, nothing remains but the bases, which were considered necessary for the support of the church. It seems that they were pulled down about 1822, to save the expense of their restoration! a piece of vandalism which destroyed the originality of the building and the *raison d'être* for its nickname of "the church *aux trois clochers*."

The building is 265 feet long, 65 feet broad and 59 feet high. The nave is divided into five bays, the choir into four, and the apse into five; but these latter are much narrower than those of the nave. In the seventeenth century, the timber roof of Abbot Morard gave place to a stone vault, the transepts were rebuilt and the nave much altered; but quite recently it has been restored to its primitive condition and decorated with frescos by Flandrin. The church having been used during the Revolution as a saltpetre manufactory, the corrosive waters had so undermined the foundations of the pillars, that they were obliged to be supported by enormous scaffoldings while the bases were repaired.

Most of the present capitals are copies of the twelve remaining original ones which were transferred to the garden of the Hôtel Cluny; but they are of very inferior workmanship. The subjects treated are various: angels, saints, the Lamb of God, Daniel surrounded by the lions, priests celebrating the Holy Mysteries, Samson breaking the jaw of the lion. The old capitals are rough but full of character, whereas the modern ones are utterly devoid of any. In the Hôtel Cluny may also be seen the upper part of an early ivory crozier belonging to the abbey, which was found in a coffin during some excavations in 1854 — also some fragments of stone coffins. The choir is almost as it was in the twelfth century. The dedication was celebrated by Pope Alexander III, on the 21st April, 1163; and on the same day Hubald, Bishop of Ostea, and three other bishops consecrated the apsidal chapels. The east end inclines towards the south-east, but Monsieur Guilherney ascribes this rather to difficulties of construction, which always occur when a new building is placed amongst older ones of which it is to be a part, than to the legend which attributes this arrangement (so common in mediæval churches) to the position of our Lord upon the Cross.

The columns resemble those of Notre Dame in their massiveness. All the arches of the choir and chapels are round, but those of the apse and clerestory are pointed. The capitals of these choir pillars are all worthy of study, being in the best style of the period, and full of the quaint symbolism of the Middle Ages. The bases are all ornamented with foliage; but between the second and third chapels on the south side is an example of ornament which is probably unique, viz., two slippers, one embroidered and one plain, evidently those of a bishop or abbot.

The original high altar, restored in 1704, has been completely destroyed; but in 1792 it still remained in all its pristine beauty and splendor. The frontal was copper-gilt, with silver-gilt figures under canopies. The *châsse* of St. Germain was in the form of a church, and enriched with precious stones. It was made in the time of Abbot Guillaume III in 1408–9, and contained 26 marks, 2 oz. of gold, 250 marks of silver, 260 precious stones and 197 pearls. The history of such stones and pearls, of all this silver and gold, would be interesting could it be traced since the probable breaking up and dispersion ninety years ago.

The Louvre contains some of the antique cipolin marble columns of the baldichino, which were brought from the ruins of a Roman town on the African coast in the reign of Louis XIV. The tomb of St. Germain, the scene of so many miracles, is no longer to be seen, having been covered up by the pavement. It was near the fourth column of the choir on the north side, and had been a favorite place for prayer, since the eleventh century.

The chapel of St. Symphorien, at the end of the nave on the south side, is modern, having been consecrated by St. François de Sales, on the 27th April, 1619, and the monument which marked the first burial place of St. Germain is no longer in it. The chapels of Ste. Marguerite and of St. Casimir, in the transept, are ornamented with marble columns. That of the Blessed Virgin is modern, in wretched taste; and the high altar is thoroughly out of keeping with the rest of the church. The first stone was laid by Pius VII.

In an apsidal chapel are some fragments of thirteenth-century glass, representing St. Anna and Joachim, the Annunciation and the Marriage of the Virgin. In the south side of the nave is a large marble statue, called Notre Dame la Blanche, given in 1340, by Jeanne d' Évreux to the Abbey of St. Denis. Placed at the Revolution, in the Musée des Petits-Augustins, it was afterward transferred to St. Germain. The marble statue of Ste. Marguerite is by one of the brothers of the convent, Jacques Bourlet; and that representing St. François Xavier, is by Couston, the younger. The tombs were restored in 1824, but not in the complete splendor of former times. The principal ones are the following: Jean Casimir, King of Poland, who became abbot in 1669, after having renounced his throne, and who died in 1672. The kneeling figure is by Marsy; the bas-relief by Jean Thibaut, of the Congregation of St. Maur. Olivier and Louis de Castellan, killed in the service of the king in 1644 and 1669, by Girardon. William Douglas, eighteenth Earl of Angus, who died in 1611, and his grandson James Douglas, killed in 1645, near Donai, aged twenty-eight. The epitaphs, which the Academy set up in 1819 to the memory of Nicolas Boileau, of René Descartes, of Jean Mabillon, and of Bernard de Montfaucon, which were formerly at the Musée des Petits-Augustins, were placed here on the suppression of that Museum. Boileau reposed formerly in the Sainte Chapelle, and Descartes at Ste. Geneviève. What remained of the royal tombs were transferred to St. Denis; of the riches of the Treasury nothing remained, it was all pillaged and dispersed.

The whole church has been painted in polychrome, and a series of frescos by Flandrin, decorate the nave, choir and transepts. Hippolyte Flandrin is one of the few nineteenth-century artists, who has shown himself capable of uniting the sentiment of the early painters with the knowledge of the moderns. His work is as purely religious in feeling, as it is academical in execution. His saints and angels are in expression equal to those of Giotto, Fra Angelico and Filippo Lippi; while his figures are as perfectly modelled as those of Titian and Tintoretto. But then Flandrin was a Catholic, and was not ashamed of calling himself a believer in the doctrines and mysteries of the Faith. The man who considered religious painting to be "the height of art, and the most worthy employment of genius," and who wrote upon the door of his studio, "Thou Lord, hast made me glad through Thy work; I will triumph in the works of Thy hands;" could not have been as a Christian, on a much lower level than Fra Angelico, who, history tells us, painted his pictures upon his knees. Flandrin was the favorite pupil of Ingres, and won the Grand Prix de Rome of 1832. Humble-minded, gentle, courageous, he worked for love, rather than for fame or money. His early struggles when he first arrived in Paris from his native place were terrible. He lived in a veritable garret with his brother, sacrificing anything in order to work at painting. Often in winter they went to bed at 5 o'clock in the afternoon to escape the cold of their attic. Their dinner was frequently some fried potatoes bought at stalls in the streets and squares; and it is probably to the privations endured for love of art that his bad health and early death may be attributed. But his enthusiasm carried him on; and he lived long enough to count his sacrifices as nothing compared to his successes. He stands out in this nineteenth century an example to all artists, and as the one man who can be compared to the blessed monk of Fiesole.

Not a little pleasant is it to find that Ingres when he heard of his pupils' forced asceticism, exclaimed — "And I was taking their money!" Indeed there are many anecdotes which prove as much the devotion of the pupils for the master, as the love of the master for the pupils. Many traits in Ingres's character come out in the history of Flandrin's early artistic career, which prove him to have been sympathetic to the highest degree. He was inconsolable the first time Flandrin failed to gain the Prix de Rome — "You have no notion how hard it is for a young man's hopes to be dashed to the ground!" he said to his wife; and he spoke of him as the "Lamb which had been slaughtered." He knew that it was unjust, and he felt the injustice as much as if it had been done to himself. The account Flandrin gives his brother Auguste of the whole affair is most touching, but too long to be related here. But we must not omit an anecdote of another sort, a quaint trait in the character of a gend'arme. Flandrin was in the habit of taking portraits for very small sums to eke out his existence, and he promised to do this man's for 30 frs. When it was finished the gen d'arme was so pleased that he exclaimed, "I promised you 30 frs., but here are 35!"

The choir was the first part of St. Germain which was decorated, and it is the most successful, the nave pictures being somewhat flat, and faded in color; but without the use of gold it was impossible to make the subjects effective with the bright polychrome surroundings, and Flandrin justly considered that the nave should be subordinate in splendor to the choir and sanctuary. On the right and left of the commencement of the choir are two large compositions, "Christ

entering into Jerusalem," and "The Way of the Cross," both on gold grounds. Above these are the twelve Apostles clothed in white, and the allegorical Virtues; and higher still are the founders of the church, Childebert and St. Germain, with the patron St. Vincent, Queen Ultrogothe, and Abbot Morard. The frescos of the nave occupy the space between the tops of the arches and the bases of the clerestory windows. Each arcade contains two pictures; in all twenty compositions. The subjects are from the history of Our Lord, and the corresponding Old Testament types and antitypes. Thus we see the "Annunciation," and the "Burning Bush," side by side with the text: "*Domine, mitte quem missurus es.*" Then comes the "Nativity," and the "Fall;" and the text: "*Per hominem mors, per hominum resurrectio.*" Next the "Adoration of the Magi" and "Balaam;" the "Baptism," and the "Passage of the Red Sea;" the "Institution of the Eucharist," and the "Priesthood of Melchizedech;" on the opposite side are: "The Treason of Judas," and "Joseph Sold by his Brethren;" the "Crucifixion," and the "Sacrifice of Isaac;" the "Resurrection," and "Jonah being ejected by the Whale;" the "Dispersion of the Apostles," and the "Building of Babel;" the "Ascension," and the "Last Judgment." Above these are numerous personages, single and in groups, from Adam downwards. All are conceived in the truest religious spirit, and although they may not all be equally vigorous, or equally good in color, yet of their beauty and nobility there is no question.

Flandrin died at Rome, whither he had gone for his health, on the 21st of March, 1864, and was buried at Père la Chaise; but the funeral service was held in the church he did so much to embellish, and on the left side of the nave, his friends placed a monument to his memory. The epitaph is scarcely in keeping with the man or the place.

A. HIPPOLYTE FLANDRIN.

"SES AMIS, SES ÉLEVES, SES ADMIRATEURS, LYON, 22, MARS, 1809, — ROME, 21, MARS, 1864."

Not one word of what he loved above all things, his home, his country, his art, and his God. S. BEALE.

THE WESTERN ASSOCIATION OF ARCHITECTS.

IN THE CLOISTER OF ST SAUVEUR AIX. FROM REVOIL.

THE third annual meeting of the Western Association of Architects was held in Chicago, Wednesday, Thursday and Friday, November 17-19, at the assembly rooms of the Permanent Exchange and Exhibit of Building Materials, at 15 Washington Street.

FIRST SESSION.

President Dankmar Adler, of Chicago, called the Association to order at 11 o'clock, on Wednesday morning, and read his address, saying, in effect that: —

He welcomed the visiting architects, as president of the Illinois State Association. He felt grateful for the privilege of being part, not of a renaissance, but of a naissance in architecture, for he recognized the birth of an American style of architecture, developed by the wants, conditions and limitations of the nineteenth century. The first work of a good architect is never the equal of his subsequent works. Compare Richardson's North Church at Springfield, or his American Express Company's Building at Chicago, with the North Easton Town-Hall, the Marshall Field Building in Chicago, or the Pittsburgh Court-House; compare Post's Troy Savings-Bank with the Produce-Exchange; compare Root's Riddle House with Byram House, or his Grannis Block with the Insurance Exchange or the Rookery Building, for proofs of this assertion. He referred to the work in America of the European architects who made this their home, and brought their methods and styles with them. Their work though good, was not American; but the influence of this work shows itself on our architects of to-day. Yet this European influence has been thoroughly Americanized. How thoroughly American is Post's Italian of the Produce Exchange. How American is Richardson's reproduction of the sombreness and dignity of the Palazzo Strozzi in the Marshall Field Building. How American is the application of Indian *motifs* in Root's ornamentation of the Rookery Building. How American are Sullivan's reminiscences of the training of the École des Beaux-Arts. This growth of a quarter of a century has called out unstinted praise from European critics. This praise however, applies only to our private work. Our governmental works are carefully excluded from favorable mention. This difference is due to the fact that in public work we find an alleged competition. In private work we find the real competition. In public work as the result of this so-called competition we have a picture, or at best, a plan, the mere shadowy presentment of partially evolved ideas, premiated and made the basis of the work to be executed; in the other case a living architect is selected to evolve and carry out living ideas. In private practice the architect becomes imbued with the enthusiasm of the client, and the client receives the benefit of this enthusiastic devotion. In a public competition this sympathetic enthusiasm is absent, and its benefit is lost to both sides. By active work this deeply-rooted evil must be extirpated. Before attacking this sham competition as applied to large work, let us correct the occasional lapses into it in private practice. To do this we must learn that the architect's functions are the application of his knowledge, taste and skill, and that he is not a vender of plans. In the most recent instance of a competition conducted as they best can be, we are told by the successful architects that they "began a study of the problem by laying out all plans that they could devise for such a building and such a lot. Their value as to exterior light was then compared, and the one herewith submitted giving the best results was therefore chosen." This is exactly what they would have done had this work come to them in their ordinary practice; but the element of personal enthusiasm between client and architect was lacking. As to the cost of this model competition? Forty-seven architects expended probably $25,000 in cash, or its equivalent, and a vast amount of vital energy all for the chance that one of them would be given the opportunity to expend $7,500 more, and earn $20,000, and the glory of having vanquished his fellows in fair and open combat. Such a method of doing business is not conducive to the elevation of the profession or the public. Public governmental buildings should, perhaps, be designed under free, honest and intelligent competitions, so that the best architects will compete in them. But the rescue of these competitions from the slough of corruption into which they have fallen, is a task of stupendous difficulty for this and kindred organizations. To accomplish this we must be united and true to each other, so that we may influence for good not only the national and other legislative bodies; but the great American people which creates and moves them all with resistless power, which no amount of corruption can withstand.

The Secretary called the roll, and sixty-nine members responded. A number of members who were also present were temporarily absent at roll-call.

The minutes of the last meeting were not read, as they had been widely published heretofore.

The Executive Committee recommended the following architects for membership: S. B. Abbott, of Springfield, Mo.; Fridolin Herr, Dubuque, Ia.; L. D. Grosvenor, Jackson, Mich.; S. E. Des Jardines, Cincinnati, O.; A. W. Hayward, Wichita, Kans.; C. B Cook and John F. Cook, Chillicothe, O.; William N. Aiken, Cincinnati, O.; Mason Maury, Louisville, Ky.; E. B. Bassford, St. Paul, Minn.; W. J. Dodd, Louisville, Ky.; C. C. Burke, Memphis, Tenn. They were all elected members.

Mr. W. F. Hackney, of Des Moines, Ia., resigned as a member of the committee to visit the American Institute of Architects at its New York meeting.

Mr. W. W. Boyington reported that the committee on raising the standard of professional requirements for membership had not held a meeting during the year.

Mr. Adler, calling Mr. Sidney Smith, of Omaha, to the chair, made a report as chairman of the committee appointed to take charge of the bill governing the office of the Supervising Architect, in which he stated that in union with the Committee of the American Institute of Architects, a bill had been prepared, and was introduced into Congress, by the Hon. A. S. Hewitt. Mr. D. H. Burnham, of Chicago and himself, representing the Western Association, and Mr. A. J. Bloor, representing the Institute, went to Washington, and had a hearing before the Committee on Public Buildings and Grounds, but met with indifference. There seemed to be a fear that the free and general competition which has been one of the features of the proceedings would work detrimentally, perhaps, to the interests of local architects in the vicinities where public buildings might be erected. Mr. Bloor is informed by Mr. Hewitt, that there is no hope for the passage of the bill, unless there is a strong pressure brought to bear on Members of Congress by the press and by constituents. He recommended that efforts be kept up, and an endeavor made to push the bill to a passage in this or some subsequent Congress. The report was accepted, and the committee continued.

The members of the committee to represent the Association at the next meeting of the American Institute were announced as follows: Messrs. W. L. B. Jenney, Chicago, Ill.; J. F. Alexander, Lafayette, Ind.; John W. Root, Chicago, Ill.; Sidney Smith, Omaha, Neb.; J. G. Haskell, Topeka, Kans. The President was empowered to name substitutes for those unable to attend.

As Chairman of the Committee on Statutory Revision, Mr. Adler stated that no attempt had yet been made to get the bill before any Legislature. The bill has been printed, and he recommended that special committees be appointed by State associations to push the bill the coming winter in individual Legislatures. The report was accepted, and the reorganization ordered.

Mr. Adler suggested that the nominating of officers, and choosing a place for the next meeting, two things usually left until the close of the session, and then hurried through, be taken up earlier, and given the attention its importance deserved. His suggestions were afterwards embodied in a motion by Mr. I. Hodgson, and two committees of seven members each were appointed to place two tickets of officers and locations in the field to be voted on by printed ballot. The motion prevailed, and the chair appointed as committee number one: Messrs. J. F. Alexander, Lafayette, Ind.; L. S. Buffington, Minneapolis, Minn.; William Holabird and L. D. Cleaveland, Chicago, Ill.; C. C. Hellmers, Jr., St. Louis, Mo.; George W. Rapp,

Cincinnati, O., and Mrs. Louise Bethune, Buffalo, N. Y. As members of committee number two, the chair named: Messrs. D. W. Millard, St. Paul, Minn.; S. M. Randolph, Chicago, Ill.; E. H. Taylor, Des Moines, Io.; Sidney Smith, Omaha, Neb.; Samuel A. Treat, Chicago, Ill.; C. A. Curtin, Louisville, Ky.; P. P. Furber, St. Louis, Mo.

Adjournment was then taken until 2.30 P. M.

SECOND SESSION.

Mr. C. C. Hellmers, Jr., of St. Louis, moved that the President appoint a committee of three members from each State association to collect information in regard to legal decisions relating to building interests and that they report at the next annual convention. In the discussion which followed, he suggested that a little pamphlet of these decisions would often prevent an architect from getting into trouble. The idea was opposed by Mr. Ketcham, who desired to see the Western Association take the question up, but Mr. Hellmer's motion at length prevailed.

The executive committee recommended the following applicants for membership: J. F. Wing and M. S. Mahurin, of Fort Wayne, Ind.; Eugene S. Caukin, Los Angeles, Cal.; Geo. W. Thompson, Nashville, Tenn.; M. F. Isbell, Goshen, Ind.; J. M. Freese, Columbus, O.; and Bernard Vonnegut, Indianapolis. They were elected. The application of Mr. James King, of Huntingdon, W. Va., not being accompanied by any recommendation, was referred back to the executive committee.

Mr. Louis H. Sullivan, of Chicago, then read an essay on "Inspiration." It was an allegorical and poetical production which commanded close attention during the thirty minutes of its delivery. Mr. Sullivan prefaced this essay by saying that to write an essay on inspiration is like writing an essay on eyesight. It is something we all know about, but is very difficult to define. Therefore, he indulged in no definitions, but treated the subject in the language of metaphor. He divided the essay into three parts, being a direct appeal to nature, whence all our emotions and all our inspiration must come, taking nature in its most impressive and deepest phases — the phase of growth, the phase of decadence, and the inscrutable cause underlying both of these. Part first, was "Growth, a Spring Song;" part second, "Decadence, Autumn Reverie;" part third, "The Infinite, a Song of the Depths."

The committee on State organization reported as follows: —

"Your committee on State organization has the honor to report that in the prosecution of its labors it has met with a hearty and cordial coöperation. We have successfully organized State associations in the States of Minnesota, Iowa, Illinois, Nebraska, Kansas, Missouri, Ohio, Texas and Indiana, all of which are working in an harmonious and satisfactory manner. Mr. Harteau, your committee from Wisconsin, asks that one member from Milwaukee be added to his committee. Mr. Osgood, of Michigan, asks that one member from Detroit be added to his committee. Mrs. Bethune, your committee from New York, has organized a Buffalo society of architects, fourteen members, who are working in an harmonious manner, and has turned her attention to the various other cities in the State with prospects of success. We think best that this committee be continued until associations in every State are organized."

On motion of Mr. J. W. Yost, of Columbus, the report was accepted, and the committee continued.

Mr. Vonnegut, of Indianapolis, stated that the Indianapolis Society of Architects had presented a protest against the Indiana State Association and called for its reading. He was informed that the protest was being held back by the executive committee by request from both factions, in the hopes that the trouble might be adjusted.

It was suggested by Mr. Normand S. Patton, of Chicago, that as there had been an association formed in Milwaukee, that its leading spirit be appointed on the committee with Mr. Harteau, and the local association be broadened out into a State association.

Mr. John W. Root, of Chicago, offered the following important resolution: —

"Whereas, in the case of each building constructed from the designs and under the supervision of a member of this Association, the owner should be supplied with full data of all essential points involved in its construction.

"*Resolved*, That the executive committee have printed and mailed to each member of the Association a form, the object of which shall be to supply to the members, under the seal of the Association, a schedule of points in relation to which the executive committee deems it advisable that clients should be informed."

Mr. Root stated that when an architect had a building constructed for one purpose devoted to another, the measure of his responsibility was very difficult to estimate. Great damage may result by heedless overloading of a building designed for light manufacturing, when it is turned into a warehouse, and through no fault of the architect. The form should state all the essential points of structure in the building, its intended purpose, weights intended to be carried by floors, loads supposed to be delivered on the clay at the bottom of the foundations, character of columns, etc. In furnishing the owner with this blank, the architect should disclaim personal responsibility if the building is diverted from its original purpose without consultation with him. The resolution was unanimously carried, and the Association adjourned until 10 o'clock, A. M., on Thursday.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

THE MANHATTAN STORAGE WAREHOUSE, FORTY-SECOND STREET, NEW YORK, N. Y. MR. JAMES E. WARE, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial and Gelatine Editions.]

Plans and a description of this building will be found in our issue for February 2, 1884.

GRACE CHURCH, WEST FARMS, N. Y. MR. W. A. POTTER, ARCHITECT, NEW YORK, N. Y.

This church, exclusive of the windows — by Tiffany & Co. — and the oaken chancel furniture, which are gifts, cost $6,000. It will seat 200.

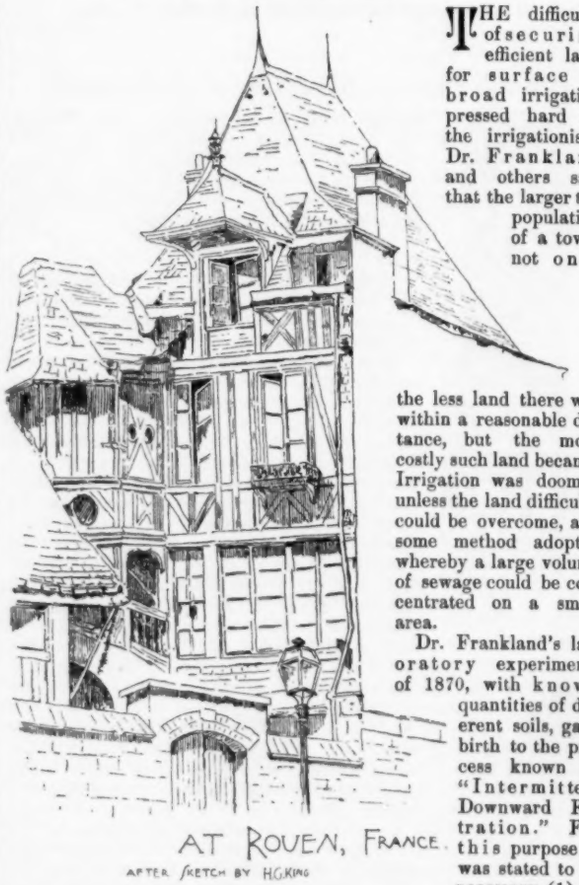
BITS IN AN OLD FARM-HOUSE, NATICK, MASS. SKETCHED BY MR. HENRY BACON, JR., BOSTON, MASS.

SKETCH OF THE TOWER OF THE 138TH STREET STATION, N. Y. C. & H. R. R. R., NEW YORK, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

THE CATHEDRAL, SEVILLE, SPAIN, AFTER AN ETCHING BY DAVID LAW.

THE TREATMENT OF SEWAGE.[1] — IV.

II. — INTERMITTENT DOWNWARD FILTRATION.



THE difficulty of securing efficient land for surface or broad irrigation pressed hard on the irrigationists. Dr. Frankland and others saw that the larger the population of a town, not only the less land there was within a reasonable distance, but the more costly such land became. Irrigation was doomed unless the land difficulty could be overcome, and some method adopted whereby a large volume of sewage could be concentrated on a small area.

Dr. Frankland's laboratory experiments of 1870, with known quantities of different soils, gave birth to the process known as "Intermittent Downward Filtration." For this purpose it was stated to be necessary (1) to have a suitably constituted soil, which will act as a filter; that is, a soil not too open, so that anything may pass through, but not too close, so that nothing may pass through. (2) To have the land deeply drained, say at a depth of six feet, so as to allow a considerable distance for percolation. This constituted filtration as opposed to irrigation. The land becomes an oxidizing instrument, to burn the impurities, and so transform them into harmless gases, rather than a mere separating machine. To obtain the best effects of oxidation, and to keep the land in the most effective condition, the

[1] A paper by Dr. C. Meymott Tidy, read before the Society of Arts, April 14, 1886, and published in the *Journal* of the Society. Continued from No. 569, page 243.

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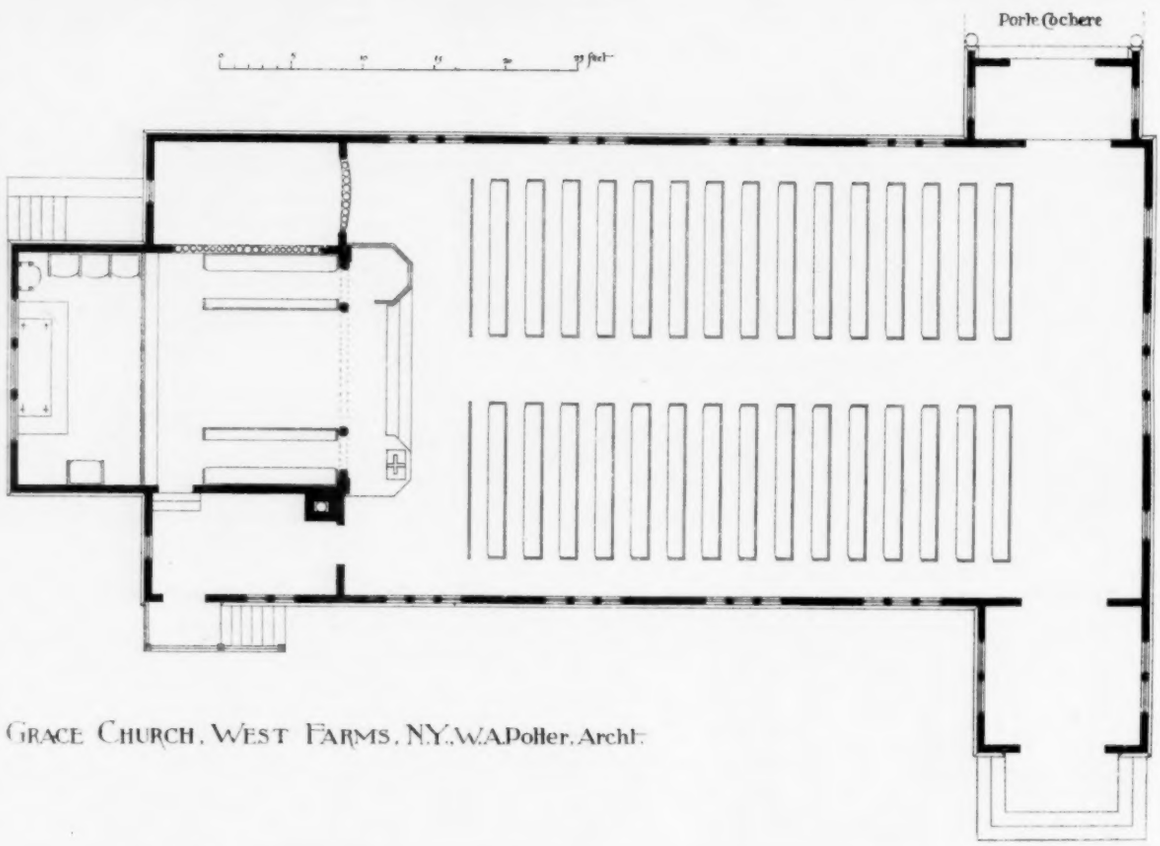
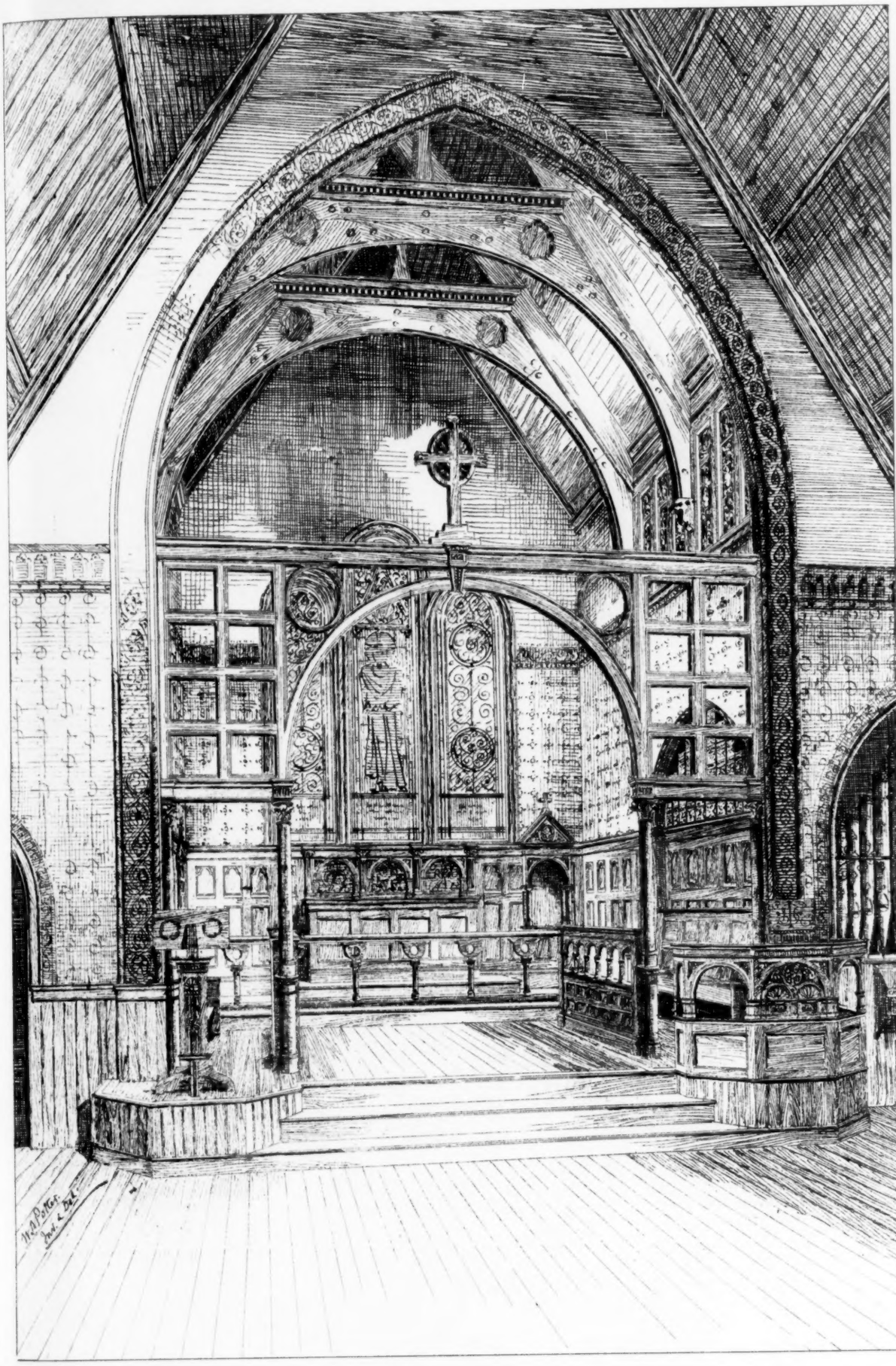


GRACE CHURCH, WEST FARMS, N.Y. W.A. Poller, Archt.



Hollyer Frères & Sons

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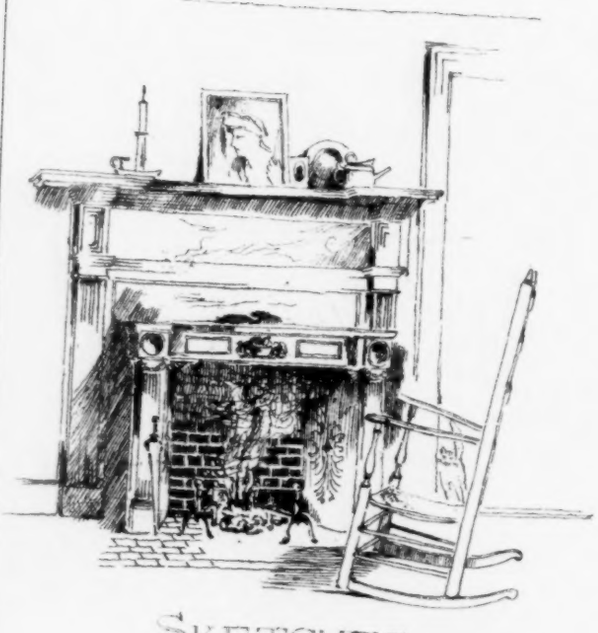

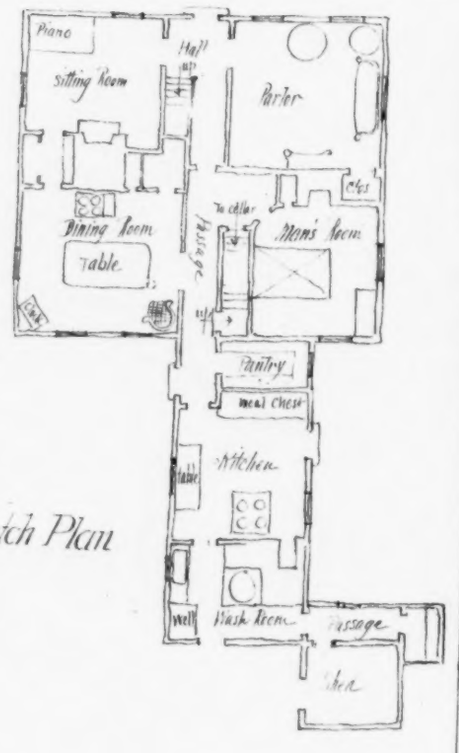

Sketch Plan

SKETCHES

in a Farmhouse, Natick Mass

Henry Bacon Jr. Del.

Halftype Printing Co. Boston.

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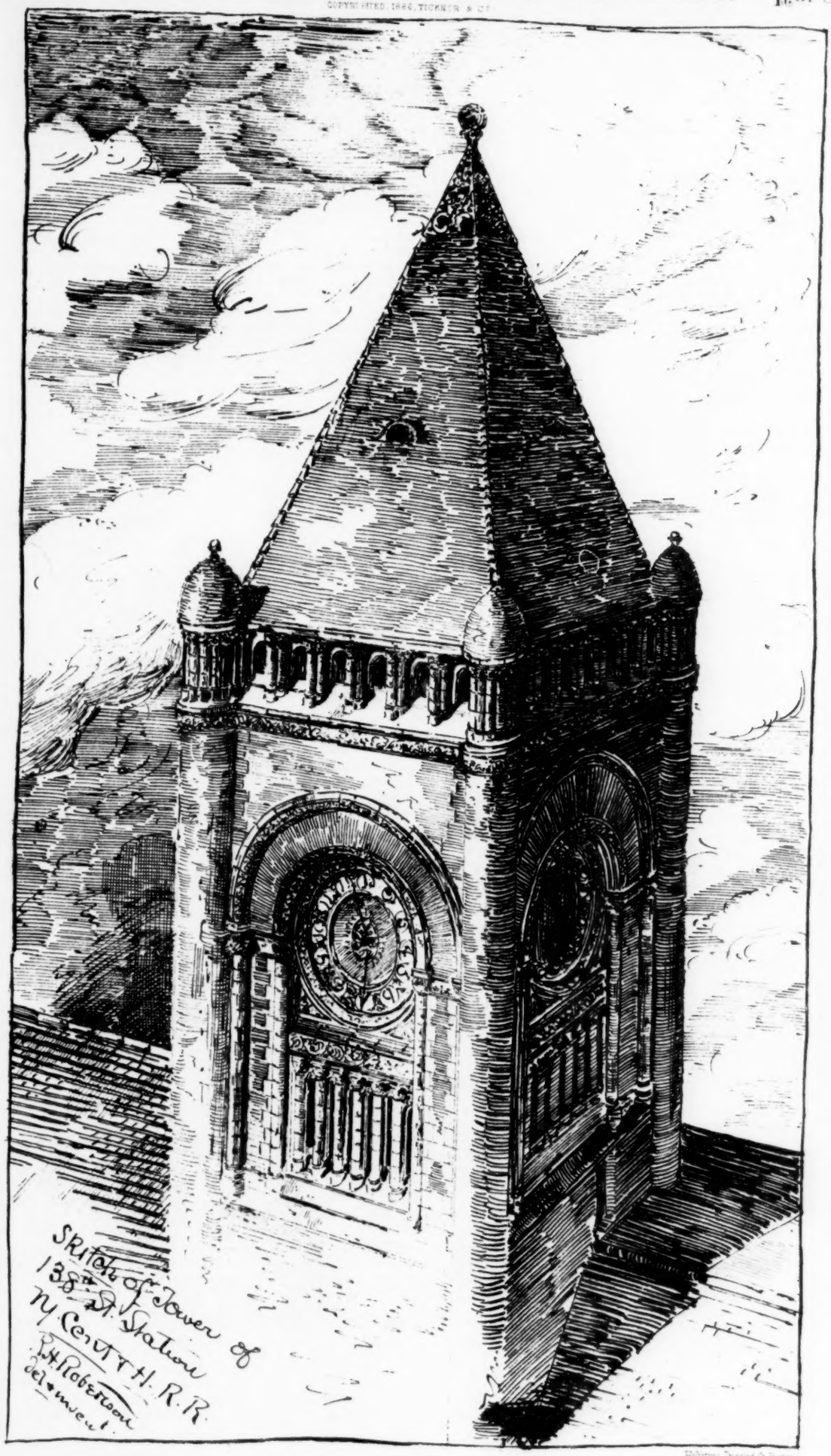


Sketch of Tower of 138th St. Station N.Y. Cent. & H. R. R.
F. H. Robertson del. & invt.

sewage must be applied intermittently, *i. e.*, with regulated intervals of rest, to give time for air to go into the ground as the water runs out, thus fitting it for a fresh dose of sewage. Intermittent filtration, Dr. Frankland would say, is a copy of nature in the lung action of respiration, alternately receiving and expelling air. This intermittent work avoids, he would contend, the clogging of the soil, and secures its efficient and frequent aëration. By such means Dr. Frankland stated that the sewage of 3,300 people could be treated on one acre of land.

Let me endeavor to give an illustration of the method of working the intermittent downward filtration system.

Suppose a population of 9,900, with three acres of suitable land suitably drained. Each acre, for purposes of work, is subdivided into four parts, the sewage of 3,300 being placed successively for a period of six hours on each quarter acre. Thus each quarter acre receives the sewage of 3,300 people for six hours, eighteen hours' rest being allowed before it receives another dose. Some have suggested, in further development of the idea of intermittency, that one of the three acres might be used per year for the 9,900, so that each acre would have two years during which it might the more perfectly recover itself, whilst each quarter-acre of the one acre in use for the year would have eighteen hours' rest out of the twenty-four. It is no misnomer to call this "intensified irrigation."

But Dr. Frankland's arguments were based on laboratory experiments. The varying effects of the varying qualities of sewage on the one hand, and the enormous differences in land, as regards its capability of absorption and filtration on the other, seem to have been very imperfectly considered. Nor were the difficulties arising from subsoil water taken into calculation, nor the density of the soil in the laboratory experiments, as compared with its density in the natural state. I am fully aware that Dr. Frankland would say that the estimate of 3,300 to an acre supposes proper land — properly drained, properly levelled.

It is right, too, we should note, that Dr. Frankland has from the first insisted that intermittent downward filtration involved the sacrifice of the manurial value of the sewage, the area of ground being too small, and the quantity of sewage too large, to make it pay. This view, however, Mr. Bailey Denton in no way endorses; on the contrary, he considers that the system of the intermittent application of sewage to land in no way interferes with, but actually assists, farming operations.

Both Dr. Frankland and Mr. Bailey Denton agree in considering the removal of the suspended matter in the sewage before its application to the land to be unnecessary. Mr. Bailey Denton, however, advocates the use of furrows (rather than flooding the land), partly as a means of preventing the clinging of solid sewage matter to the stalks and leaves of plants, and partly with the object of bringing the sewage into contact with the roots, which are the active abstracting agents of manurial worth. Indeed, Bailey Denton goes so far as to say that the presence of the suspended sludge in the sewage is an advantage rather than a bar to its application to land. By making some furrows of greater depth than others, he renders these the receptacles of the solid matters. The sludge, he says, "consists of vegetable and animal substances which are perishable, mixed with earthy and mineral substances which are not perishable." It is only necessary to remember this "to realize the fact that they cannot possibly clog the land when dry. The most minute particles consist of fine road sand which floats on in the liquid after the heavier detritus has deposited itself. When these perishable and imperishable substances find their way into the soil, they must each, from their nature, obviously add to its porosity, inasmuch as the perishable substances leave open spaces as they decay, whilst the imperishable substances, from their gritty nature, necessarily help to increase its filtering capabilities. So long as the sludge is wet it impedes absorption to a certain extent, but when once dried and the land broken up by the plough, it not only ceases to uphold the liquid, but naturally and permanently helps to let it into and through the soil." In other words, by digging the sludge into the soil, Mr. Denton contends that the soil is rendered more percolative than before. There may be something in this view. But how often have we seen, in practical working, sewage being applied to land, clogged by large masses of black albuminous matters, the result of previous irrigations, closely adhering to the soil, impeding absorption, and lessening the surface through which the water can pass into the ground. Mr. Denton says, "the sludge must then be allowed to dry, and when in a fit condition dug in." But in the act of drying comes the nuisance. In hot weather it means putrefaction (Mr. Denton calls it decomposition of perishable substances), and with putrefaction comes a stink, besides which it is in the act of evaporation that dangers occur from detrimental matters being carried bodily into the air. In filter-beds, we know full well that the surface of the filter-bed is that part most affected, and further that, for efficiency, the surface of the filter-bed needs frequent removal and cleansing, whilst irrigated land shows neither to the eye nor to chemical analysis much indication of any excess of organic impurity a few inches from the surface.

Let us take two cases by way of illustrating the practical working of intermittent downward filtration: —

The Merthyr Tydfil farm, with its 50 feet of gravel soil, may be taken as pattern ground for the system. Nothing, moreover, was spared to make it a success under the able advice of Mr. Bailey Denton. The mean depth gave two cubic yards of drained soil for every square yard of surface. The cost of preparation was very great. But how about number to the acre? Is not the actual number of persons per acre more nearly 1,000 (I think I am much overstating it) than 3,300? Is not the sewage of Merthyr very dilute by reason of its admixture with subsoil water?

At Kendal again, Mr. Denton, in 1873, advised the purchase of 16 acres of suitably constituted soil, upon which to treat the sewage of 13,500 persons, with a mean dry weather discharge of 975,000 gallons. The Council, with the Report of the Rivers Pollution Commissioners before them, deemed Mr. Denton's suggestion of 16 acres extravagant. If, said they, one acre will do for 3,300, why advise 16 acres for our 13,500, of which very few (probably not one-third) contribute sewage. The Council, however, decided to be liberal, and advised the purchase of 5½ acres of land. The cost of the Kendal sewage-farm was £16,371 (I quote from an official document); and the cost of laying out the filter-beds £1,400, *i. e.*, about £280 per acre. But can the Kendal effluent be deemed a success? Some 11 acres have been added since 1880. The Council have let the land, and I fear the process adopted can scarcely, at the present time, be regarded as intermittent,

I admit to the full the power of soil to purify sewage by oxidation. I admit, moreover, the advantage of intermittency of action, *i. e.*, of intervals of rest alternating with intervals of work. The entire success of the process, however, depends on perfect aëration during rest, to fit the soil for its next period of work. My experiments lead me to doubt the efficiency of a rest of eighteen hours only, even when the sewage has had the solids in suspension removed. But of this I am certain, that when the suspended solids have been allowed to remain in the sewage, the glutinous constituents of the sewage, together with the *papier maché* material in solution, clogs the ground with an impervious covering, whereby the entrance of air is very much retarded. Further, the sewage, when applied after the period of rest, cannot flow through the ground on the surface readily, on account of the glutinous layer and *papier maché* film. Thus, as a result, the period of rest fails to become, *quâ* the soil, a period of aëration. This condition will be aggravated should the effluent water, from any circumstance, not flow freely away. Thus the very conditions of success may be, and as I know often are, thwarted during the period of rest, as the result of the preceding period of work.

And here I will quote from an excellent paper by Dr. John M. H. Monro, read before the Society of Chemical Industry, and printed in their journal (January 29, 1885). He says: —

"There are several causes for this disappointing want of success [referring to broad irrigation], but the chief among them is the inability of arable soil to deal with a continuous supply of sewage without great deterioration in its purifying and aërating properties, so that at last it becomes 'sewage-sick,' and inefficient as a purifying agent. This is not completely remedied by intermittent filtration or irrigation, for the land which has been often covered with crude sewage never recovers, even by rest, its original efficacy. The commonly-accepted, and I believe the true explanation of this is, that the slimy suspended matter of the sewage gradually chokes the pores of the soil, forming a deposit impervious to air, and thus preventing the aëration to nitrification, and, on the other hand, encouraging putrefactive fermentation."

Difficulties of a practical nature crowd upon us in considering this method of treatment. Three, at any rate, may be noted: —

1. The cost of preparing the land for the work.
2. The difficulty of securing proper land, or of ensuring its effective working at all times, in all weathers, with all kinds of sewage, and under all circumstances.
3. The fact that much of the solid filth of the sewage will, unless previously removed, accumulate on the surface, where it undergoes decomposition and becomes, especially in hot weather, a formidable nuisance.

Intermittent downward filtration had its birthplace in the laboratory. Whether the earth used were cube feet or yards, or six-foot tubes, many details besides this mere statement of the work accomplished are necessary. Was the earth used surface earth? How was the sewage collected? Was the earth exposed to the modifying influence of wind, light and rain? How long was the earth used — a week, a month, a year, or longer? It is to be feared that a new birth in sewage treatment needs a less cramped cradle than a London laboratory. You cannot learn how to direct an army in the field by practising with toy soldiers. No laboratory experiment pure and simple can teach sewage treatment.

We now turn to the hygienic aspect of sewage irrigation. I shall speak of three classes of effects rendering sewage irrigation dangerous to the public health: —

1. Offensive and injurious emanations.
2. Pollution of subsoil water.
3. Distribution of undefæcated sewage containing the ova of entozoa.

I. OFFENSIVE AND INJURIOUS EMANATIONS.

Of such emanations, the evidence is ample. (Flower "*On Sewage Disposal*," p. 13, *re* Aldershot farm.) The River Pollution Commissioners (first report, p. 87) admit that odors do arise from land irrigated with sewage, day after day, for years. The Craigentinny meadows, near Edinburgh, can only be described as filthy, emitting a stink hardly endurable. The surgeon to the barrack adjoining the meadows, described the stench (1868) as "sickening." Of the

Croydon Sewage-Farm, at Beddington, Dr. Creasy, Surgeon to the Orphan Asylum at Beddington, stated that "typhoid fever had been in every cottage on the estate" — every disease, in fact, assuming a particular type, accompanied by what is called "a sewage tongue." In fact the stink of sewage-irrigated ground, and the malarious effects of the sewer gases evolved, are matters of frequent complaint and litigation. Dr. Clouston traced an outbreak in dysentery in the Cumberland and Westmoreland asylum (where there were 200 patients) to the effluvia from a sewage-farm (*Medical Times and Gazette*, June, 1865). The dysentery appeared soon after the sewage was used, 31 being attacked, of which 20 cases proved fatal. The farm was 300 yards from the female ward, where the greater number of cases occurred. The sewage-farm was removed, and the dysentery disappeared. The following year some land near the asylum was again irrigated, when another outbreak of the disease occurred. The facts show incontrovertibly that sewage emanations may be the cause of dysentery, diarrhœa and typhoid fever.

The investigations of Letheby into the cause of an outbreak of typhoid at Shaftesbury and the adjacent village of Enmore Green (1862), where one-eighth of the population were attacked in one year (viz., 448 cases in a population of 3,500), clearly point to the morbific effects produced by sewage emanations. We have the same authority pointing to a similar case at Copley village (which lies at the junction of the Hebble Brook and the River Calder) having a population of 1,000, where an outbreak of typhoid occurred from the irrigation of a plot of meadow land with the sewage of Halifax. Dr. Edlin traced, he considers, an outbreak of scarlet fever (twenty-three cases) at Haileybury College, near Hertford, to offensive emanations from a field saturated with sewage, the cases occurring in the dormitories nearest to the garden receiving the urine and slops of the establishment. (Flower "*On Sewage Disposal*," p. 10.) Such cases are numerous. I suppose few sanitary facts are so well established as that certain epidemic diseases may be propagated by the excremental pollution of air and water. To keep sewer-gas out of our houses was one of the many great lessons taught us by Murchison. The referees appointed, in 1856, to consider the main drainage of the metropolis, had sound reasons for expressing fear of irrigation on a large scale, lest it should occasion danger to the health of the inhabitants by the pollution of the air of the district — a view, it may be noted, entertained by Liebig, and expressed by him in his well-known letter to the Lord Mayor (1865). There is, too, a remarkable statement by Copland, that the effects of sewer-gases are never so bad as when emitted from sewage spread out upon the land. This statement is worthy of consideration. Solid matter is given off during evaporation. As the turpentine in lead paint is evaporating, solid lead carbonate is carried into the air, and produces lead poisoning amongst the inmates of the freshly painted house. This cannot result from any volatility of the lead, but merely from the mechanical dislodgement of lead particles during the evaporation of the volatile constituents of the paint. For when the smell has gone the danger has passed. The sanitarian recognizes the importance of defecating the excreta of the typhoid patient as soon as evacuated, and of removing it from the sick-room without delay. And why? To prevent the *materies morbi* being carried into the air during the evaporation of the liquid portion. It must, therefore, be an unscientific method to spread the sewage of a mixed population over the land, thereby increasing the area of evaporation. Mr. Hawkesley's words may be quoted here. They are the record of one whose unique experience is only rivalled by his acute powers of observation: — "Water irrigation carried on in warm weather is exceedingly unhealthy. I can speak positively to it from repeated observation in different places, that the odor, particularly at night and particularly upon still damp evenings in autumn, is very sickly indeed, and that in all these cases a great deal of disease prevails. The sewage forms a deposit on the surface of the ground, that deposit forms a cake of organic matter, and organic matter when it is in a damp state, as it usually is, gives off in warm weather a most odious stench." (Committee of House of Commons, 1870.)

I am aware that in many cases the sewage before application to the land is submitted to a rough process of filtration; but even in these cases it is no uncommon thing to see masses of partially dried fæcal matter, the remains of previous irrigation, lying about the farm, giving off a filthy stench, and ready to be washed into the nearest stream by the first heavy shower of rain. Such a condition seems peculiar to no soil. Aldershot, with its porous soil (although, strange to say, described by the Rivers Pollution Commissioners as "well managed,") Banbury, with its sandy clay, and Warwick, with its stiff clay, one and all testify to the truth of what I say.

There is yet another point to be considered. That a district saturated with moisture, and more particularly if along with the moisture there is an excess of organic matter (I am excluding specific morbid emanations) is unhealthy and malarious, the fens of Lincolnshire and the rice fields of China, not to speak of other places, supply abundant evidence. Buchanan, in a masterly research, has shown that phthisis is more prevalent where there is a wet atmosphere than where there is a dry one, whilst Pettenkofer, of Munich, regards fever and cholera as dependent on fluctuations in the level of ground-water charged with sewage. The case is serious. Saturate — be continually saturating a large area with sewage water, and as a consequence be continually raising the subsoil water, an increased humidity of atmosphere must result, and conditions favorable to malaria, fever and phthisis.

Dr. Sturge, in 1879, in a paper before the Institution of Surveyors, gave some important details respecting the Sewage of Paris (see also Society of Arts Conference, 1879, p. 151). Seventy per cent of the Parisian houses have cesspools, but even of the remaining 30 per cent, the solid excrement is not allowed to enter the sewers. Some analyses of Paris sewage were given (respecting which, however, I speak with caution) showing 56 grains of organic, and 123 grains of inorganic matter per gallon.

Of the total 60,000,000 gallons daily of Paris sewage, 10,000,000 are treated on 914 acres of land at Gennevilliers. This land has about five inches of alluvial soil resting on ten feet of sand and gravel. I omit all reference to the agricultural success or non-success of the Gennevilliers farm, but it must be noted that authorities consider that the value of building land in the neighborhood has decreased, and that the health of the inhabitants suffered from a rise in the level of the subsoil water. (Report of M. Lefèvre, President of the Société des Géomètres of France.) I quote Dr. Sturge's words (p. 153): — "Great complaints have been made that since the introduction of the irrigation, ague has become far more common than it was before, and more deaths occur from diarrhœa and dysentery."

One thing is abundantly evident, even to any untrained observer, viz., that it is impossible to insure a pure effluent by an irrigation process. The land which is covered with an active crop of vigorous vegetation, is a totally different purifying area from the same land upon which no rye grass or other vegetation is growing. The land under the influence of summer warmth and active evaporation is entirely different from what it is at times of frost or snow. The land flooded with heavy rains is different land from what it is in dry weather. Inequality of purification, uncertainty of action — at one time good, at another doubtful, at another absolutely useless — is the record I have to give from personal observation, and that on no limited scale, of irrigation as a method of purifying sewage. The sewage comes every day to be treated, and no earthly power can say whether your farm is or will be in a condition to deal with it. And more than this, the very condition that increases the quantity of the sewage to be dealt with (such as heavy rain) is the very condition that renders your land temporarily disabled. And yet further still, the very condition that increases the bulk of your sewage, or at any rate its polluting character — the population — is that condition which renders costly the land in the neighborhood, and probably makes it altogether impossible to procure at any price. I give, on the next page, certain analyses of sewage effluents from different farms.

II.—POLLUTION OF SUBSOIL WATER AND OF RUNNING STREAMS.

The select committee on the sewage of towns, although champions of irrigation, admit that if the power of the soil be overtaxed (that is if too much sewage be applied) there must of necessity be injury to wells and running streams.

III. — DISTRIBUTION OF UNDEFECATED SEWAGE CONTAINING THE OVA OF ENTOZOA.

The fact has always been recognized that entozoic diseases have an external origin — *i. e.*, that the ova or parasites come from without, and are not generated within the human body. Millions of ova are voided with every segment discharged by the person afflicted with tapeworm, each ovum being capable of producing a measle in the flesh of an animal, and each measle a tapeworm in the body of the man.

Here, then, are two serious consequences of irrigation worth considering.

I have seen water-cresses and celery grown on sewage ground, having a quantity of dried sewage matter deposited on the stems. I have, with more than a cook's patience, tried to wash this matter off, but the tenacity with which it sticks upon the surface of the vegetable when once dry is perfectly astounding. Be it remembered that water-cresses and celery are eaten uncooked. I have seen cabbages and turnips, not merely grown on sewage ground, but carefully prepared arrangements made for a weekly flooding with sewage, the market produce being placed in a kind of reservoir permitting sufficient raw sewage to flow into it, so that it may completely cover the vegetation.

The grass covered with sewage, eaten as it is with rapidity by the cattle, infect their bodies with the larval parasite. Thus the meat is measly, and measly meat, except for efficient cooking, means tapeworm to the human subject. Perhaps a similar story might be told of trichina, with its ten times greater danger. No doubt, as an accident, the danger is constant, but sewage-irrigation would practically render it an affair of certainty. In other words, sewage always contains excremental ova. The farm, therefore, that receives sewage must be more liable to produce measly meat than the farm that does not receive it.

"May we not, indeed," says Dr. Cobbold, "but too reasonably conjecture that the wholesale distribution of tapeworm eggs, by the utilization of sewage on a stupendous scale, will tend to spread abroad a class of diseases some of which are severely formidable? So convinced am I of the truth embodied in an affirmative reply to this latter query, so certain am I that parasites are propagated in this particular way, so surely do I see unpleasant results if no steps are taken to counteract the evil, that I feel myself bound to speak out boldly, and to produce no uncertain sound in the matter, which

most closely concerns humanity. The whole question is, in truth, of vast hygienic importance."

ANALYSIS OF SAMPLES FROM SEWAGE-FARMS.

Constituents per gallon.	Matters in solution.					Matters in suspension.		
	Total solids.	Ammonia.	Oxygen required to oxidize the organic matter.	Nitrogen as nitrates.	Chloride of sodium.	Total solids.	Organic and loss on incineration.	Mineral.
ALDERSHOT FARM.	grs.	grs.	grs.	grs.	grs.	grs.	grs.	grs.
Raw sewage	53.93	7.54	4.38	0	14.92	43.77	29.75	14.02
Effluent	54.12	5.74	3.73	0	19.41	10.17	4.91	5.26
Blackwater stream before receiving effluent	18.93	0.18	0.35	0.26	4.12	2.68	0.69	1.99
Effluent after straining	53.73	7.54	4.40	0	15.36	35.01	26.24	8.77
BANBURY FARM.								
Raw sewage	48.87	3.81	1.42	0	8.94	3.27	1.86	1.41
Effluent	39.73	0.48	0.83	0.63	8.46	0.38	0.13	0.25
WARWICK FARM.								
Raw sewage	47.21	2.20	0.86	0	11.05	24.67	11.87	12.89
Effluent	52.63	0.32	0.48	0.10	9.12	0.26	0.13	0.13
RUGBY FARM.								
1 Raw sewage	36.67	4.43	0.92	0	8.41	1.28	0.64	0.64
1 Effluent	37.87	1.28	0.42	0.21	7.44	0.32	0.13	0.19
2 Raw sewage	43.40	3.84	0.95	0.22	—	9.52	4.48	5.34
2 Effluent	36.11	0.48	0.30	0.23	—	—	—	—
WORTHING FARM.								
Raw Sewage	30.33	0.23	0.32	0.33	—	4.38	0.87	3.51
Effluent	40.67	0.08	0.12	0.34	—	—	—	—
CARLISLE FARM.								
Raw sewage	30.17	1.92	0.78	0.03	—	3.62	2.17	1.45
Effluent	17.67	0.19	0.27	0.10	—	—	—	—
CROYDON FARM.								
(*a*) Beddington Raw sewage	27.67	2.00	0.43	0	—	10.16	4.12	6.04
(*a*) Beddington Effluent	27.17	0.12	0.24	0.35	—	0	0	0
(*b*) Norwood Raw sewage	41.00	2.00	0.91	0.55	—	11.01	6.03	4.98
(*b*) Norwood Effluent	58.19	0.32	0.82	0.60	—	1.98	0.18	0.80

Let us review our facts. We have dilute sewage to deal with. We desire to be sanitarians, viz., to purify our sewage so that it shall not poilute our water-courses or cause nuisance. We desire to be economists, viz., to get out of the sewage all that is valuable in it. In a word, we desire to achieve, by one and the same operation, a sanitary success and a commercial profit. In sewage treatment, as in other things, you cannot combine the impossible. Achieve your commercial success, and you must abandon sanitary considerations. You must, as at Edinburgh, flood your land with your thousands of tons of sewage per acre, until your farm is a stinking morass, and your effluent water so impure that you must take it directly into the sea lest you foul your water-courses. Achieve your sanitary success, sprinkle your 300 tons per acre per annum on your land with hose and jet, and away goes your agricultural profit. Try a compromise between the extremes of the 300 and 10,000, and you get the difficulties of both with the advantages of neither. I admit possible exceptions: a small population; cheap land removed from human habitation; a porous soil admitting free percolation; happy gradients not requiring steam-power; proximity to the sea, so that extreme purity of effluent need not be demanded; proximity to a town, so that a ready sale for the sewage grass for dairy purposes can be secured. But the difficulties are enormous. I must have enough land — and the greater the population with whose sewage I have to deal, the greater the quantity of land required, and the larger, probably, its price. I must have proper land — sufficiently porous, but not too porous, properly levelled and drained. If the level of my land be above the sewer outfall, I require costly motive power. The larger the quantity of sewage (as in wet weather) with which I have to deal, the less able is the already overloaded ground to cope with it. Frost or snow, the work has still to be done. At all times the effluent must be sufficiently pure, lest litigants be aroused. At all times the operations must be conducted without offensive smells from an over-sodden state of soil, and without polluting the air by rendering it abnormally damp or polluted by sewage effluvia, the prolific source of typhoid. The subsoil water must be so diverted that neighboring wells shall not be polluted. Grant all these difficulties overcome, and there remains as the produce of my farm a grass only fit for dairy purposes, and even then likely to be a source of entozoic infection to man and animals.

[To be continued.]

QUICK-LIME USED TO PREVENT THE STAINING OF LUMBER. — The lime treatment for preventing lumber in pile from staining promises to be of great value to lumber manufacturers and shippers. The theory is that the stain is the result of a fungous growth and that such growth is destroyed by the fumes of quick-lime. As stated in these columns last week, the Peninsular Lumber Company applied the lime by sprinkling it over the courses as the boards were piled. Others have found it efficacious to simply dump a barrel of lime under the four corners of the pile. A New York gentleman who called at this office within the past week, was enthusiastic over the experiment, and said that the next shipments of yellow pine he made from the South he should certainly throw a barrel or two of lime into either end of the vessel and watch carefully the results. If a little lime in a vessel would prevent yellow pine from sap-staining, he said it was one of the greatest discoveries of the age. — *Northwestern Lumberman.*

BIRMINGHAM COMPRESSED AIR-POWER SCHEME.

IN THE CLOISTER OF ST SAUVEUR, AIX. From Revoil.

ENGINEERING gives the following abstract of the paper read by Mr. J. Sturgeon at the recent meeting of the British Association on the Birmingham Compressed Air-Power scheme, and the discussion which followed the reading:

This scheme, the leading features of which are no doubt familiar to the majority of our readers, is now attracting a good deal of attention in engineering circles, and the reading of a paper by the engineer of the company that is to work the system had been looked forward to with considerable interest. As we give in this issue a detailed description and illustrations of the proposed installation, we will confine ourselves to a brief abstract of the paper read, which will be sufficient to make the discussion which followed intelligible.

The author first pointed out the objects of the scheme, and showed that the large number of engines of moderate size used in Birmingham, often intermittently, renders some such system peculiarly applicable to the town. He then went on to say that although each 1000 horse-power at the central station may only produce 500 effective horse-power at the users' engines, it will displace fully 1000 horse-power of small boiler plant, furnaces, chimneys, etc., and the same engines can be used with compressed air as with steam. The centralization principle enables engines and boilers to be used of large power, with all the modern improvements, such as high-pressure triple-expansion, gas firing, etc. At the pressure proposed (45 lb.) the air-driven engines will indicate from 30 to 65 per cent of the power developed at the main engines, according to the mode of using the compressed air. The investigations of Sir F. Bramwell and Mr. Piercy, on behalf of the Birmingham Corporation, showed that the present consumption of fuel in small engines of from 4 to 25 horse-power varies from 36 pounds to 8½ pounds per horse-power per hour, and, as it is estimated that compressed air-power would reach the consumer at an expenditure of from 5 pounds to 2.3 pounds fuel per horse-power per hour, a saving of from 700 to 400 per cent is effected.

The works will be situated on land fronting Garrison Lane. The first portion is laid out for the erection of 15 engines of 1000 horse-power each, to be worked by Lane's patent boiler and Wilson's gas-producers. As the company have already received applications for over 3,300 horse-power, they have entered into contracts for the completion of 6,000 horse-power at the central station before May 31, 1887. The mains will all be of wrought-iron, laid in concrete troughs near the surface of the road, so that they can be easily got at for examination and repairs. They will vary in size from 24 inches down to 7 inches. Valves will be provided, by which, in case of damage to any portion of main, that portion will be automatically stopped off from the rest of the district, so as not to interrupt the general surface. The compressed air will be sold to users at a price per 1000 cubic feet of air at a standard pressure of 55 pounds, measured by a metre so constructed as to register the volume delivered at the value of the standard pressure, independently of any variations there may be in the main pressure. The meter consumption of the various users will be registered in the gross on a dial at the central works by electric apparatus, so that any waste or misuse of the air can be at once discovered and prevented.

The paper concludes with a discussion of the various economical aspects of the question, pointing out that compressed air can be used for all purposes for which steam is employed, except heating; air, on the other hand, has the advantage over steam that it is available for refrigeration.

The discussion was opened by Mr. H. Davy. The author had quoted a statement of his that in the application of water for craneage of goods, an efficiency of not above 25 per cent was obtained. This was but a partial statement, and he, the speaker, would say that the general efficiency of hydraulic power was much higher, probably 50 per cent. He had had a good deal of experience with compressed air for mining purposes, and would give, as the result of his observations, an efficiency of from 25 to 30 per cent for a pressure of 45 pounds above atmosphere. In a table exhibited on the walls the author had set down the efficiency at 84 per cent, and he was at a loss to see how this could be realized. The speaker then went on to criticise other figures in connection with the scheme, but he appeared to have misconstrued the bearing of the calculations, and the author interposed to give the necessary explanation. The same mistake was afterwards made by other speakers, and indeed the table shown was somewhat misleading when read by itself, although quite straightforward when taken with the text in the paper referring to it. Mr. Davy also criticised the engine condenser, a drawing of which is shown. It appeared to combine the features of both a surface and jet condenser. He would like to hear what advantage was gained by this arrangement. Professor R. Smith, in speaking of the consumption of fuel in small engines, which had been put down by the author as high as 36 pound, an amount which

had been thought too high by a previous speaker, said that, in intermittent work, he could easily understand such a fuel consumption would be reached. He knew of many small engines, constantly working, which required 12 to 13 pounds of coal for each indicated horse-power developed, and if they had to stand for frequent periods of time with steam "up" in the boilers, he should anticipate such a fuel consumption as that named by the author would be reached. This argument was in favor, not only of general distribution of power by air, but by gas, through the means of gas-engines, and by electricity also. Birmingham was an especially favorable field in which to try an experiment of the nature proposed by Mr. Sturgeon and those working with him, because of the large number of small workshops requiring a little power, and that often of an intermittent nature. The efficiency of air transmission decreases less than with most other agencies with distance. In hydraulic pipes there is the friction; in electricity there is the heating of wires, but the loss in the case of air is very small. Professor Smith has met with cases in collieries in which power generated on the surface had been taken to accumulators below at a distance of one mile to one mile and a half, and there had actually been greater pressure registered at the accumulators than at the compressors. This, of course, was to be accounted for by the effect of barometical pressure, and the difference, though of small practical importance, served to show how slight was the effect of viscosity and friction in air. The speaker thought that for small distances and limited applications air would not pay, and gave, as an instance, the practice in the Aberdeen granite quarries, visited last year by the members of the Association. He had been surprised to find air was not used as a vehicle for distributing power in the various machines, but the owner said that steam was found to be cheaper. The distances there were from 300 to 500 yards, and the loss for condensation would therefore be small, and would be more than counterbalanced by the advantage of not having to introduce another machine, such as the air-compressor, with the loss that was always attended on the use of such mechanism. For long distances, however, he had no doubt air was the best vehicle for conveying power; still he did not agree with Mr. Sturgeon's calculation as to 33 per cent of the original power being obtained at the air-engines. The largest item of loss was the heating of the air in compression and cooling in storing and conveyance in pipes. In summer there would be the advantage of using the exhaust from the engines for ventilation. The difficulty of getting rid of frost round the exhaust outlets had been referred to, but this could be got over by making them trumpet-shaped.

Mr. A. Rigg said that the use of steam for power distribution in New York had been mentioned, and the failure of the system has been referred to. Two companies had been started for the purpose. One had laid cast-iron pipes and the other wrought-iron pipes. The result had been that the cast-iron pipes were constantly bursting and blowing up the pavement, and the company had subsequently "burst up" too. The wrought-iron pipes were, however, all right, and the company that laid them was going on. The loss of pressure from end to end of the system was only about 2 pound, or practically nothing. As to efficiency, anything could be got on paper, and he would wait for practical results.

Mr. Wright mentioned an interesting historical fact in connection with the use of air-pressure as a means of conveying power. In the year 1804, at the works of Boulton & Watt, William Murdoch had worked a lathe by a blast from a blowing-engine, the motor being 400 yards away from the source of power. Professor Unwin pointed out that in course of practice the experience gained would enable many percentages of loss to be reduced. Professor Hele Shaw criticised the author's design of meter, objecting to the application of the bent tube as in the Bourdon gauge; but the limited time at the disposal of the meeting compelled the president to ask the speaker to close his remarks, and Mr. Sturgeon was then asked to reply to the discussion.

In reply to Mr. Davy's remarks, he said that before he went into this question he was of much the same opinion as that held by Mr. Davy as to 25 per cent being the average efficiency of engine-power in working with compressed air in collieries. In a colliery, however, the air-compressor itself worked intermittently, for there was seldom enough work to keep it going. In the supply system for a large town, such as that then before the meeting, the conditions would be entirely altered, and the law of averages would give them practically constant work. In addition to this there would be the greatly increased size and more finished machinery in their case to set against the rough colliery appliances. The loss of leakage as shown by the experience at St. Gothard was practically nothing. Allusion had been made to the efficiency of the air in the St. Gothard Tunnel, but there, too, the same conditions did not exist, as the St. Gothard compressors had only to work one set of machines, and the question of intermittent work again arose. In the course of the discussion the theoretical loss by heating in compression and subsequent cooling had been dwelt upon. He wished to remind his audience, however, that there would be certain conditions in the practical work they proposed which would upset these theoretical deductions. They would cool the air during compression, and in many cases it would be reheated during expansion by means of waste heat from flues, etc., on the users' work. He thought that if the whole of the conditions were taken into account, instead of isolated facts without the concurrent conditions bearing on them, as had been done by some speakers, that it would be found that his figures accorded pretty closely with those of many of his critics. With regard to the 84 per cent efficiency, for instance, which had been so freely questioned, there was a loss of 12 per cent in main engine and compressor, friction in valves, etc. For leakage in mains and friction, wire-drawing, etc., at consumers' engines another loss of 13 per cent was set down. They would regain 20 per cent by reheating the air to 320°. This would give 95 per cent, but against this there was to be set the loss for clearance and back pressure in users' engines, which would give a total efficiency of 84 per cent.

Sir James Douglas, in summoning up the discussion, referred to the satisfactory working of compressed air that had come within his experience, and thought that the author had made out a very good case which had not been shaken by the discussion.

Mr. Preece added that in the Post Office air was more used as a means of conveying power than electricity, and he should be glad at any time to put his experience at Mr. Sturgeon's disposal.

COMMUNICATIONS

MILL FLOORS IN BOSTON.

To the Editors of the American Architect:—

Dear Sirs,— Mr. Atkinson's letter about mill floors in Boston ought to open a very useful discussion, which I would like to begin by noting a few points that occur to me.

Mr. Atkinson, in describing a building forty feet wide, as built on the slow-burning principle by the Boston architects, objects to the spacing of the posts so far apart as twelve feet; to the heavy longitudinal girder, which, as he says, is exposed to fire, catches dust and interferes with light; and to the spacing of the floor timbers only five feet apart, which interferes with the best arrangement of sprinklers.

In regard to the first criticism, about the excessive distance between the posts, I think all architects will agree with me that owners on account of the inconvenience caused by columns to many kinds of business, are rarely willing to set these nearer together than the maximum distance allowed by law, which in Boston is twelve feet. In the older stores, built before this regulation was made, the columns are often fifteen or sixteen feet apart.

As to the girder, the law here again interferes, and requires in Boston as in New York, that every store or warehouse more than thirty feet in width shall have either brick walls, *or girders supported by posts*, running from front to rear, and dividing the building into spaces not exceeding twenty-five feet in width, this being for the purpose of tying the front and rear walls together.

The spacing of the cross timbers is a matter partly of strength, and partly of economy. As most people suppose that placing the timbers five feet from centres answers every purpose of slow-burning construction, and as wider spacing would require the addition of an inch or more to the thickness of the planking over the beams, without diminishing the amount of timber to be used in the beams themselves, they naturally frame in this way; but Mr. Atkinson's point about automatic sprinklers, which is probably new to most of us, should, and undoubtedly will be in future, considered as far as possible. In many cases, however, the wider spacing would be impracticable, on account of the expense which would be involved in supporting in that way the weights with which we have to deal. Mr. Atkinson gives us four floors, the strongest of which, employing 8″ x 16″ hard-pine beams, ten feet on centres, and twenty feet long, will carry safely 106.69 pounds per square foot of floor. Now, 8″ x 16″ beams of hard-pine are expensive and difficult to get when wanted, and at 107 pounds to the square foot, even with the comparatively short clear span of nineteen feet, the floor would not be half strong enough for a building intended for general store or warehouse purposes. The New York Building Bureau used to publish a list of the loads per square foot of floor, independent of the weight of the floor itself, which must be provided for in various classes of warehouses. I have not the table by me at the moment, but the average load for dry-goods stores was taken at 200 to 250 pounds per square foot, and the standard for other kinds of business varied from this to 500 pounds or more. According to my experience, these estimates of weight which were probably made from actual measurement in stores of the kind referred to, were quite low enough. Not long ago I had occasion to determine the load to be provided for in the stock floor of a store in which the goods sold consisted entirely of bottles of ink and mucilage packed in boxes with sawdust. These would seem light goods compared with glass or metals, yet the weight of the boxes on the floor of the warehouse in which the measurements were taken, as left by the porter who piled them up, was 510 pounds per square foot, over a considerable part of the floor. Of course, the vacant aisles between the piles of boxes reduced the average, but even allowing for these, I did not feel justified in calculating my new floor for less than 350 pounds load per square foot.

In another case, where the building was leased to various tenants for storage, I found, a few days ago, 190 pounds of load per square foot, including the aisles, and the cases were so concentrated over the middle of the beams that I was obliged to calculate the load as equivalent, in its strain upon them, to an average of 210 pounds. Still another floor, measured about the same time, had an average load, including aisles, of 267 pounds to the square foot. Of course,

a loft for storing furs, or hats in boxes, is safe with a strength of 106 pounds per square foot, but the same loft may be let, when the hatter's lease expires, to a hardware merchant, so that the Boston law does wisely in fixing the minimum load, exclusive of the weight of the materials, which a store or warehouse floor shall be capable of bearing safely, at 250 pounds per square foot, and it would do still more wisely if this could be modified by prescribing greater resistances for floors intended to carry flour, metals, glass, or other heavy goods.

With such weights to provide for, and columns to be spaced as far apart as possible, girders, either of iron or wood, are useful, even if the law did not require them for other reasons. That they might, and should be, if possible, raised to the level of the floor timbers is certainly true, for avoiding, in the case of wooden girders, excessive effects from shrinkage, if nothing else, but this is usually supposed to involve either stirrup-irons for hanging the cross-beams, or weakening the girder by mortising. It need not necessarily involve either of these, as a two-by-four piece may be bolted or hung with irons, on each side of the girder, and the cross timbers notched upon this, but such a device would lessen the security against fire, and is not always to be recommended.

In regard to the objectionable practice of resting timbers directly on top of wooden posts, without an iron cap between. Mr. Atkinson's note is very timely, and will not be forgotten by those architects who like to get definite facts in aid of the rules they have learned. Very truly yours, C.

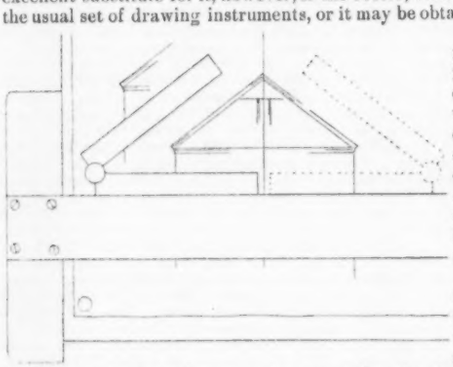
THE ISOGRAPH.

BOSTON, MASS., October 27, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — For several years I have used a simple instrument in architectural drawing, the great convenience of which seems to be unknown to draughtsmen generally; at least I have seldom found any who had learned its value.

In England the instrument is better known, and is called an isograph, but I do not find it here at dealers in artists' materials. An excellent substitute for it, however, is the sector, which is often one of the usual set of drawing instruments, or it may be obtained separately.



The accompanying cut shows it in use as recommended. Its value lies in its convenience in drawing, where opposite equal angles are required, as in gables, roof-sections, etc.

The usual slower method of laying off with dividers is dispensed with, for when one side is drawn to the centre line, by simply turning the instrument over the opposite side is given with absolute accuracy.

DRAUGHTSMAN.

THE R. I. B. A. TRAVELLING CARD.

November 18, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — The British Institute of Architects have prepared a card intended to facilitate the access of members to notable buildings for the purpose of sketching or examination. The card requests "all those whom it may concern to allow Mr. —, whose signature is on the card, and who is travelling for the purpose of architectural study, to sketch, measure, or otherwise examine any ancient or notable buildings or monuments under their charge, and to afford him such reasonable facilities and assistance as may lie in their power." The card is stamped with the seal of the Institute, and on the back is a translation into French, German, Italian and Spanish. From personal experience I know of how great value such a card would be in the saving of time, trouble and annoyance, abroad, and how many doors it would open which, without such a passport, even a silver key would fail to unlock.

I do not think such a voucher, issued by the American Institute of Architects, would be of much value, for most of the custodians whom it would be desirable to impress are convinced that America is largely peopled by Indians, except, perhaps, a few bankers and miners, who pass their time principally abroad.

Why could not our Institute, perhaps at its convention and through its secretary of foreign correspondence, secure the coöperation of the British Institute, to the end that the latter should issue their very useful cards to such Fellows or Associates of the American Institute as come to them properly-vouched for by our trustees. It would be a very graceful act on their part, and one which would be much appreciated, I doubt not, by hundreds of American students and architects who go abroad every year. If such a passport is valuable to a young student, it is doubly so to a busy architect, who steals away for a few weeks, and who desires to do all the sight-seeing available upon the route he has chosen with little loss of time and a minimum of friction. When time is no object it is no serious matter to hunt up a burgomaster or a *maire*, and, after an explanation and a good deal of box-wood sawdust, to obtain a pass to some church or collection; but when an architect's itinerary covers, as it always does, a great deal of ground in a very few days, such an aid would conduce much to his comfort. W. G. PRESTON.

NOTES AND CLIPPINGS

CLOCK-MAKING IN THE BLACK FOREST. — Consul Ballow, of Kehl, Germany, has been looking up the curious subject of the clock industry of the Black Forest. The "cuckoo clocks" of that region, he finds, are widely sold through all the civilized world. This country imports them to the extent of $50,000 a year. In the Black Forest there are 92 communities engaged in this industry, with 1,426 independent clock-makers, giving employment to 7,526 operatives. In 1796 these workshops turned out 75,000 clocks; in 1808, 200,000, and in 1880 the total production was 1,800,000 clocks. In the city of Furtwangen were manufactured over 400,000 of these. It would appear that this crop of timepieces is more remarkable for quantity than quality, for Consul Ballow writes: "One cannot be too particular when purchasing one of these clocks, for when the cuckoo will not coo any more, and the trumpeter will not blow another blast, then is their value as curiosities gone, and when, after a few months, they become valueless as time-keepers, then are they very poor stock indeed. I have heard so many complaints from people who have purchased these clocks in regard to their general poor quality that I deem it my duty to make this fact public, and also to inform would-be purchasers that, if they wish to avoid disappointment, they should be very particular where and of whom they purchase, and in no case to purchase of irresponsible parties." — *N. Y. Commercial Advertiser.*

ACTION OF WATER ON METAL PIPES. — From the Excerpt Minutes of the *Proceedings* of the British Institution of Civil Engineers we take the following article on the action of water upon metal pipes:

Widely-different opinions have been published on these subjects by experts, and even the official regulations with reference to the employment of various kinds of water-pipes are greatly at variance. Thus, in Germany, Switzerland, and in other places, galvanized-iron piping is used without hesitation, while by Government decree the use of pipes of this kind is forbidden in Austria, and in one instance their employment in Saxony was objected to. Some recent investigations of Mr. Lory, of Grenoble, have shown that water containing organic matter in solution attacks iron pipes very speedily, and after many analyses of water conveyed to Grenoble from different sources of iron pipes, and also of water known to have attacked pipes and led to the formation of scabs or carbuncles of oxide of iron in other places, Mr. Lory had invariably found that the scabs — consisting mainly of hydrated oxide of iron — contained from 5 to 10 per cent of organic matter. He has been led, therefore, to conclude that the destructive action upon such pipes is due, in the first instance, to substances of organic origin. This may, to some extent, explain the reason why in some places cast-iron pipes remain quite free from corrosion, whereas, in other cases, even after six months, as happened to Grenoble, they became covered with rust carbuncles. The influence of soft water on lead pipes is considered in the light of a recent report of Dr. White, Medical Officer of Health of Sheffield, and some experiments conducted last year at the Hygienic Institute of Pesth, are quoted, in which the water passing through a pipe 39 m. in length was found to contain from 0.085 to 4.7 mg. per litre of lead; the latter high percentage only occurred, it is true, after the water had remained in contact with the lead for a month. In view of the destructive action of some kinds of water on cast-iron pipes, information is sought concerning the protection afforded by covering the pipes internally with a coating of magnetic oxide, and the results of any experiments bearing upon this question. — *The Metal Worker.*

WHAT THE ELECTRIC LIGHT COSTS IN PHILADELPHIA. — "Philadelphia obtains electric lights cheaper than any other large city in the country," said Chief Walker of the Electrical Department, yesterday, in speaking of the apparent increase of 400 per cent in the appropriations to his department during the last three years. "The average cost is less than 55 cents per night a lamp, and the truth is most of the companies that do lighting for the city lose money by it. Many of them make their figures very low for the privilege of being allowed to place their wires upon the city poles, and cover their loss in the charges to private customers. There are 352 lights paid for by the city, and they cost $10,000 less than they would in other cities. As to the expenses of the department, the increase since 1884 is more apparent than real, and what there has been is for improvements rather than maintenance. The appropriation for 1884, when we did not have charge of the electric lighting, was $35,000, and in 1885, when it was transferred to us from the Police Department, the appropriation was $84,467. Although I asked for $178,114 for 1887, I do not suppose I will get that much. This year we had $104,995. Of this $70,664 is for the maintenance of lights already up, and I have asked for $25,000 for new lights next year. The odd $70,000 is divided among a number of companies whose prices for lamps vary. Thus the Brush Company receives 52 cents a night for its lamps on Chestnut Street, 58½ cents for those on Poplar Street, and 55 cents for those on Lancaster Avenue. The United States Company is paid 48 cents a night for its lamps on North Broad Street, 59½ for those on Deleware Avenue, and 62 cents for those on Federal Street. The Northern Electric Light Company obtains only 39½ cents

for four lights on Second Street, above Callowhill, as the wires are strung on city property. It is paid 48 cents for its lamps on Girard Avenue. A company in Frankford, whose lights only burn half the night is paid 30 cents a lamp. In Germantown the price is 55 cents. The Thompson-Houston Company, whose lights are on Columbia Avenue, is paid 48 cents a night. The average price for all the lamps is, as I said, less than 55 cents a night apiece. The cost of an electric light depends upon the number of lamps on a wire, the distance from source of supply, and other considerations. It is because of the greater distance that the United States Company charges 62 cents for a lamp on Federal Street, while for those on Broad Street it asks only 48 cents. The distribution of the lamps is, of course, a matter resting entirely with the City Councils. It is only my duty to put them up where they are ordered. The operating expenses of the electrical department have increased very little, not over $4,000 since 1884, notwithstanding the great amount of extra work we have had to perform. The number of fire-alarm boxes has increased from 150 to about 500 within that time; the fitting up of the police-patrol service has been put upon us; telephones have been placed in all the fire-engine houses and hospitals, and many improvements have been made. Certainly, the expenses of the electrical department cannot be complained of as extravagant." — *Philadelphia Record.*

Trees Unfelled are Real Estate. — There was an amusing case tried here the other day. Some smart fellows from up North were perusing around for timber and happened upon an old, unsophisticated farmer and bought from him forty walnut trees for $5 apiece as they stood. They paid the money and took a bill of sale, and the old man felt rich. When the old woman came home he told her what a bonanza he had struck. She was surprised, but was not satisfied, and said it was a Yankee trick. In a few days another feller came along and offered $10 a tree, and she made the old man sign, and she signed, too. The money was tendered back to the first purchaser, but he refused to take it and sued for the timber. The court held that trees not cut down were part of the realty, and realty could not be sold without the wife's signature; so the sharpers lost their timber and their money, too. — *The Atlanta Constitution.*

M. Maspero's Egyptian Discoveries. — Among all the countries in which archæological explorations are going on, Egypt, which is the oldest, remains the most interesting. M. Maspéro presented last summer to the Academy of Inscriptions a report of his operations for the previous nine months. He has made a wise change in giving up the monopoly of antiquities which the Bulak Museum had, offering to share all that are found with the finder. The result is that now he is informed when a discovery is made, and finds the tombs unpillaged. He has, as it were, made the poachers gamekeepers. One such undisturbed tomb, besides the owner, his wife, and a large family, contained all the implements of his trade, and, best of all, the first part of the romance of "Sinuhit," a work of the seventeenth or eighteenth dynasty, of which only the second had been previously known. These romances, it is supposed, were put into tombs to amuse the leisure of the dead; the "Book of the Dead" has one chapter designed to teach the dead to play chess in the other world. The correctness of the portrait-statues of the Egyptian monarchs have received a striking confirmation. M. Maspéro presented to the Academy photographs of mummies of various kings that have been unrolled at the Bank Museum, and stated that the face of Seti I (an account of whose tomb, by the way, with over a hundred plates, has just been published as the ninth volume of the *Annales du Musée Guimet*), which is perfectly preserved, shows a wonderful resemblance to contemporary portraits of him that have been found on monuments. Such confirmation was not needed. The features of the Egyptian kings are so individual and full of character that one could not suppose they were fancy sketches. It is curious to hold an inquest on a corpse forty centuries old. Coroner Maspéro determines, on examination of the body of Ra-skenen, that he died fighting. There are three wounds, one that knocked him over and two others that finished him, and traces of decomposition show that some time was lost in bringing him from the field of battle. Another case is not quite so clear. A man twenty-five or thirty years old was left in most unusual style, without any inscription. Moreover, he was embalmed as usual; the internal organs were not removed, but the exterior was covered with some matter at once fat and caustic. The body shows that the man died in horrible suffering, and the question arises, was he poisoned or was he embalmed alive? Here is a hint of a palace tragedy on which some antiquarian novelist may write a novel more sensational than anything that Ebers has yet given us. — *N. Y. Evening Post.*

TRADE SURVEYS

The most encouraging and reliable factor in the general trade and industrial situation is the activity in real estate in large and small cities, towns, and even villages. Real estate agents and brokers are doing an unusually prosperous business in all sections of the country from which it is possible to obtain late reports. The best part of the reports is that prices are not exorbitant, that real estate for the most part is selling near actual value. Brokers in several cities have instructions to purchase sites for manufacturing and building purposes, which are intended to employ a large amount of capital. The New England States are no exception. In many of our textile, shoe-making and machinery-making centres builders are preparing to execute instructions recently received for the expansion of mill and shop capacity, and for the building of small houses for operatives. Manufacturers are interesting themselves in house-construction in many places, partly as an investment and partly to offer some inducement to their employés to make a permanent abiding-place for themselves. Despite the fact that the building-season is almost over, a great deal of new work has recently been projected on this side of the Hudson River. The reason has heretofore been referred to, namely, that the increased manufacturing activity and the better rate of wages has stimulated investors, builders, and wage-workers. A leading New England building authority says that much more building will be done this winter than last, and that a remarkable increase will be made in the steam-power and machinery-power of all mechanical establishments. In the vicinity of New York several estates have been cut up and sold in building lots. An outward movement is in progress from the centre of the city. The business requirements are driving residences out, and a leading architect there says that more fine houses will be built along the Hudson and in outlying towns in New Jersey next year that last. Important municipal enterprises are attracting the attention of the Philadelphia Councils. The projectors of an elevated railroad in that city have renewed their attack upon the conservative Councils of that city. The projectors of an underground system predict success to their request for permission to build thirteen miles of underground road. A syndicate which has been endeavoring to purchase or lease the gas-works have been disappointed in their efforts because of an opposition of public sentiment which is being industriously worked up in opposition to the scheme, which embodies the handing over of a plant which cost in the neighborhood of $25,000,000. Another syndicate is industriously at work seeking to obtain permission to expend thirty or thirty-five million dollars in the construction of a water-supply system which will guarantee 200,000,000 gallons of pure water daily. The building operations of that city will exceed last year's by twenty per cent. The iron and steel industries of Pennsylvania and the entire country continue very active. Shipments have been made this month from foreign ports of between fifty and sixty thousand tons of steel blooms to make rails for spring railroads because of the inability of the American Bessemer mills to supply the extraordinary demand. It is probable that the urgent railway requirements will necessitate the importation of enormous quantities of foreign material. New York brokers this week have instructions to negotiate for extensive supplies for delivery in January. The same general features are observable in all branches of the iron and steel industry; new enterprises are announced in the Southern States involving large expenditures of capital in mill, furnace, railway, and shop construction. Certain movements upon the part of railway builders and the managers of large manufacturing corporations lend strength to the predictions made that a permanently higher range of prices for all kinds of crude and finished products will be established during the first quarter of next year. These interests have made extensive contracts for supplies at present prices, and their example is being followed by the smaller concerns, with the effect of creating a very wide-spread demand. Whether this will result in what is popularly understood as a "boom" remains to be seen. The strongest protection against the threatened advance in railway material is that an advance would open the way for importations. Prices for all kinds of material are advancing on the other side. This fact at once protects American makers against heavy importations, but, on the other side, lays the foundation for their farther advance here. Theorizing on this subject, however, is fruitless. The controllers of large interests are deeply concerned, not only over the possibility and probability of a general advance in crude and finished material, but over the effects which such an advance may have in checking enterprise of all kinds. They remember that the unnatural advances made in 1873 helped to precipitate the panic of that and subsequent years, and they recognized that much of the present activity is due to the low prices of 1885. Trade indications could not be more gratifying. Our highest commercial authority show increasing bank clearings in the leading cities, and an increased movement in all the staple products. Railway securities are in active demand, and an old-time confidence is reviving. In jobbing circles trade is a little dull just now because we are between seasons, manufacturers are almost everywhere and in every branch running to their fullest extent because they know that the consumptive requirements will leave them with bare stocks at the close of the season. Large amounts of money are being loaned to manufacturers for building and extension purposes. Nowhere does there seem to be any dangerous tendency to speculative prices. The coal trade is active and prices are firm, and the combinations which have controlled that industry are discussing plans and measures by which they will realize better margins next year than this. A great deal of railroad building has been projected within a week. More mileage is in contemplation now than in our railroad history. Most of the construction will be in the West and Northwest, whence the most favorable traffic and dividend returns are received. As long as railway construction can be relied upon at its present limit, so long can we have confidence in the continuation of building activity. Western building authorities are highly gratified over each succeeding week's developments in manufacturing and building. The lumber trade is strong, and prices are firmly maintained in Eastern, Southern, and Western markets. In the Northwest manufacturers have been encouraged by heavy orders from the East to crowd their capacity. Heavy receipts continue from the Southeast, and tonnage is pretty well employed for the rest of the season. A large amount of lumber is awaiting shipment in the Gulf and South Atlantic ports to Northern ports. Northern buyers are ready for it. The probabilities are that while lumber will remain high in price, no general attempt will be made to crowd prices beyond their present limit. The recent movement of labor organizations contain some assurances that a conservative management will be in the saddle next year. The trade unionists will meet in Ohio next month, and will probably express opinions which will be in accord with the true interests of labor. A jealousy exists between the trade unionists and the Knights of Labor, which is natural and which will not be eradicated easily. These two powerful branches will exert a controlling effect upon each other. The trade unionists, if left to themselves, would make no demand for shorter hours at this time. An influential faction will argue that it will be necessary for them to favor an eight-hour agitation in order to maintain their position as an organization, and do something positively popular in order to maintain their prestige as against the Knights of Labor. The Knights, as a body, favor an eight-hour or shorter-hour movement, but their leaders have taken decided grounds against a movement which involves so many risks. They prefer to direct their attention at the present time, and perhaps for the next two or three years, to the work of organization, to the putting up of machinery for the government of their intricate organization. Their leaders desire to avoid strikes because in the majority of cases they have come out second best. The trade unionists will aim to render better service to labor than the Knights, and both will endeavor to gain and cover all the ground they can. In the meantime, the employers of labor are quietly but actively at work. The Philadelphia master-builders have effected an organization which will put them in a better condition than they have been. The building interests in Chicago are endeavoring to strengthen themselves, and there is a feeling throughout the entire West that the disorganized condition of employing interests is not a wise one, and that it cannot be too soon remedied.